

A DUAL-PROCESS ACCOUNT OF REACTIONS TO
GENERAL AND SPECIFIC EVENTS: THE ROLES OF
COUNTERFACTUAL THINKING AND PRE-EVENT EXPECTATIONS

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Dedication

Breaker Boys of Pittston, PA (1911) – Despite your stunted growth and coal-blackened faces, your hopes and dreams have escaped the walls of your prison and they have mysteriously followed me. Through this entire endeavor, you have been a constant inspiration.

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John V. Petrocelli

A DUAL-PROCESS ACCOUNT OF REACTIONS TO
GENERAL AND SPECIFIC EVENTS: THE ROLES OF
COUNTERFACTUAL THINKING AND PRE-EVENT EXPECTATIONS

On the basis of a dual-process account of reactions to general and specific cases, counterfactual thinking was hypothesized to occur more frequently in response to specific events than to general events. Cognitive reactions to general events were expected to be influenced by pre-event expectations, whereas reactions to specific events were expected to be influenced by counterfactual thinking. Such differences in processing may result in different comparison cases that ultimately influence reactions to the event as well as decisions regarding similar, future events. When people experience undesirable outcomes, counterfactual thoughts allow them to imagine more desirable possibilities, and thus greater confidence for future occurrences. Five experiments were designed to investigate these and other related hypotheses. In Experiment 1, participants were visually presented with general or specific outcomes of a golfing competition. Experiment 2 asked participants to complete a trivia test and provided them with global or specific performance feedback. Experiment 3 examined the impact of both upward and downward counterfactuals following the visual presentation of general or specific highlights of a tennis match. In Experiment 4, participants were asked to play several games of blackjack and were provided with global or specific performance feedback. Participants in Experiment 5 observed actual horse racing events, received general information about the events, or received thought-listing statements made by another participant in addition to general information about the events. In each experiment, some

participants were also asked to complete a thought-listing task. Participants indicated their subjective confidence about the outcome of a similar, future event or placed bets on the outcome. Overall, the results supported the hypotheses. Counterfactual thoughts were observed more frequently in response to specific events than to general events. Counterfactual thought frequency also mediated the relationships between event type and decisions about similar, future events. A follow-up experiment to Experiment 5 provided evidence that counterfactual thought confidence also influences decisions regarding similar, future events. Although pre-event expectations were more clearly linked to reactions regarding general events than to specific events in Experiment 1, these links were inconsistent across experiments. Results are discussed in light of related dual-process theories and decision-making research.

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CHAPTER 1 – INTRODUCTION

The way that people react to an abstract case or a “general” event may be very different from the way they respond to any single, specific event of the same type (Sherman, Beike, & Ryalls, 1999; Sherman & McConnell, 1995). That is, specific instances, when compared to general or abstract cases, seem to have a unique impact on one’s judgments, evaluations, emotional reactions, and behaviors. For instance, people appear to be much more willing to expend resources to assist specific, identified victims of unfortunate events than they are for the same number of unidentified, general, or “statistical” victims (Jenni & Loewenstein, 1997; Schelling, 1968). Perhaps international organizations and charities understand this full well. Rarely do they design television commercials that employ general and statistical frames of the current, unfortunate situation (e.g., displaying hundreds of ill and impoverished children). Rather, they tend to select one ill and impoverished child and report on the background of his or her life, providing specific details that are sure to tug at the heartstrings of most viewers.

According to Sherman et al. (1999), discrepancies in reactions to general and specific cases appear to be prevalent in many domains, such as judgments of prospective and current community improvement initiatives, judgments of a group and its individual members (Hamilton & Sherman, 1996), and subjective confidence estimates in one’s own global and specific performance (Sniezek & Buckley, 1991; Sniezek, Paese, & Switzer, 1990). One interesting example is the “NIMBY” (not in my back yard) syndrome, which characterizes instances in which some people demand economic developments (or the building of more prisons) but later reject any specific plans that emerge within their own community. Another example is the prototypical coach of a professional basketball team.

He would probably be more than willing to accept an average of 10 turnovers committed by his team per game, and even perceive the attainment of such a goal as exceptionally good. However, even if the general goal is met, in the case of each specific turnover, his response may be characterized by a range of negative affects.

In a somewhat related line of research, Small and Loewenstein's (2003) work on the "identifiable victim effect" suggests that the difference between general and specific cases need not be very great to have a significant impact on judgments. They demonstrated that even weak forms of identifiability (i.e., the victim is determined without any personalizing information) can produce the "identifiable victim effect," whereby greater compassion and compensation is offered to victims who have been identified versus those who have not. Interestingly, the identifiable victim effect also appears to be restricted to a single individual rather than a more general but identified group of individuals (Kogut & Ritov, 2005). Yet, despite these studies and several years of social cognition research, the cognitive mechanisms that may underlie the differences that emerge from people's reactions to general and specific events remain unexamined.

The current investigation was designed to examine postulates drawn from Sherman et al.'s (1999) dual-process accounts of inconsistencies in reactions to general versus specific cases. Specifically, Sherman et al.'s postulates that relate to cases whereby people consider either their pre-event expectations or mentally simulated alternatives to reality, reflecting on "what could have been" (termed, *counterfactual thinking*; Kahneman & Tversky, 1982), were tested. Using five different paradigms, the degree to which people differentially engage in counterfactual thinking when processing general and specific events was examined. It was hypothesized that counterfactual

thoughts are more likely to emerge when processing specific events than when processing general events. It was also hypothesized that counterfactual thinking mediates the relationship between the type of event and subsequent judgments. On the other hand, when people judge general events, it is hypothesized that they rely more on comparison cases shaped by their pre-event expectations than they do on counterfactual responses. Thus, pre-event expectancies may also moderate the relationship between the type of event and judgments. These hypotheses are based primarily on the assumptions of norm theory (Kahneman & Miller, 1986), the account of different reactions to general and specific events outlined by Sherman et al. (1999), and the findings of a preliminary study conducted by Petrocelli and Sherman (2005).

Theoretical Framework

Sherman et al. (1999) considered the postulates of several dual-process models as possible explanations for discrepant reactions to general and specific events. Among their most compelling considerations, and central to the current investigation, was their elaboration of Kahneman and Miller's (1986) norm theory.

Norm theory holds that reactions to an event are very much influenced by the overall perceived normality of the event. Perceivers are believed to construct norms (standards of judgment) in an online fashion or to retrieve them from pre-existing expectations. When doing so, people may rely heavily on their prior beliefs and expectancies. However, because people possess the ability to mentally simulate alternatives to reality (Kahneman & Tversky, 1982), they may also counterfactualize or mentally undo specific features of an event (especially an undesirable event) that are perceived to be abnormal. Essentially, Kahneman and Miller (1986) argued that, as

people perceive the mutability (ease with which features of an event may be cognitively altered) of antecedents to increase, the more available considerations of alternatives to reality become. People often find it easier to imagine counterfactual worlds of experience when the actual events involve abnormal or unusual features, as well as near positive or near negative outcomes (see: Roese & Olson, 1993, 1995). Subsequently, the easier it is for people to imagine how desirable outcomes might have occurred or how undesirable outcomes might not have occurred, the easier it is for people to confuse such alternatives to reality with what should have or should not have occurred, and the more pronounced affective reactions tend to be (Miller & Turnbull, 1990). In sum, affective, evaluative, and behavioral reactions to an event may be intensified to the extent that alternatives to reality are easy to imagine.

Consistent with norm theory, Sherman et al. (1999) argued that the propensity to engage in counterfactual thinking is greater when processing specific events than it is when judging general or abstract events. As Sherman et al. suggested, people may respond to specific events with counterfactual thoughts more than they do to comparable general events because specific events tend to draw people's attention toward mutable features more so than do general events. Interestingly, however, general events are inherently more abstract, and they conceivably assume an infinite number of mutable features. That is, without any specific constraints, there is a considerably wide range of possible alternatives to reality. Any number of features that are not contained or described by the general frame of an event may be self-generated and mutated accordingly. On the other hand, counterfactual responses to a specific event are relatively more constrained by the specific features of the event. Consistent with this

thinking, and with the theoretical positions of Sherman et al., it appears that, despite the greater possibility for counterfactualizable features in general or global events, people are more likely to counterfactualize specific events because their mutable features are relatively more salient and easier to counterfactualize than are unspecified features that first need to be generated or assumed by the observer of general events.

Sherman et al.'s (1999) discussion of norm theory and dual-process account of reactions to general and specific events also sheds some light on mediational mechanism hypotheses. Specifically, counterfactual thinking is expected to mediate the influence that the type of event (i.e., general vs. specific) has on affective, evaluative, and behavioral reactions. This hypothesis is grounded in the notion that evaluative, affective, and behavioral reactions to an event are very much affected by the comparison case that is adopted when processing that event. If specific, but not general, events increase one's attention toward mutable features, and people tend to counterfactualize such features, then the two types of events are likely to possess very different standards of comparison. According to Sherman et al. (1999), judgments of general events and outcomes described in general terms are shaped largely by comparisons to pre-event expectations. In the case of the basketball coach's feelings about his team's average of 10 turnovers per game, he may see no viable alternatives to which to compare this rate but the team's expected average (shaped possibly by the team's previous rate, his ideal, or another team's rate). However, any specific turnover is likely to elicit a number of alternatives, resulting in a much different comparison case, and a much different set of responses. For example, specific event information, such as the referee's interference on the play or a player's untied shoelace, may prompt the coach to generate upward-counterfactuals (i.e., mentally

simulated alternatives that improve reality; Markman, Gavanski, Sherman, & McMullen, 1993) as a function of his focus on the possibility that the turnover would not have occurred had the referee not been in the way or had the player's shoelace been tied. However, when thinking about turnovers in general, this information may not be accessible or available, and thus a different reaction (one involving less extreme affect) is likely to emerge.

Clearly, reference points and standards of comparison are important to human judgment and perception (see: Biernat & Manis, 1994; Schwarz, 1999; Schwarz & Bless, 1992; Sherif, 1936). Sherman et al. (1999) argued that the processing of a specific event often involves a comparison case constructed after the event. Such comparison cases may be influenced by the counterfactuals that emerge in response to the event itself. The processing of a comparable general event usually involves a comparison case constructed before the event, which may be characterized as a pre-event construction based on pre-existing beliefs and expectations. Thus, different comparison standards for general and specific events are likely to result in different affective, evaluative, and behavioral reactions. Other areas of research are consistent with this idea. For instance, it is clear from work on temporal construal theory that, when people think about a future event from a general or abstract frame of mind, they are likely to make different decisions compared to when they think about the same event in light of its specific or concrete features (Liberman & Trope, 1998; Trope & Liberman, 2000, 2003).

On the basis of such reasoning and Sherman et al.'s (1999) use of norm theory, Petrocelli and Sherman (2005) examined one of the mediational hypotheses (whether or not the relationship between the type of event and a person's reaction to it is mediated by

the presence or absence of counterfactual responses to the event). Participants in this experiment read a brief scenario about a single family (specific) that was robbed, or about thousands of families (general) that are robbed each year while away on vacation, as a result of acting irresponsibly. The single target family, as well as the thousands of other families, was described as failing to do several things that could have prevented the robbery(ies). Participants then judged how much the family(ies) should be compensated by their home-owner's insurance as well as how responsible they were for the robbery(ies). Results showed that the difference in counterfactualizing a general versus specific event statistically mediated the relationship between event frame and compensation, but it failed to mediate the relationship between the type of frame and the perceived responsibility of the target for the outcome. Thus, the mediational hypotheses have yet to be conclusively demonstrated.

Problems Addressed by the Current Investigation

The study conducted by Petrocelli and Sherman (2005) provided some initial evidence for the usefulness of norm theory as a framework to explain discrepancies in reactions to general and specific events. However, a possible confound in the Petrocelli and Sherman (2005) study involved the clarity of the connection between the actors involved in the scenario and their specific behaviors. Participants who read about the specific event could be certain that the target was directly linked with each mutable feature described in the event. However, readers of the general event frame may not have been entirely certain that each and every target (each of the families that composed the "thousands") was directly responsible for each and every mutable feature described in the event.

If a difference did exist between the conditions in their clarity of the connection between the actors and their behaviors, then a difference in vividness of the scenarios may have emerged as well. Empirical evidence shows that vividness can enhance processing of information (Collins, Taylor, Wood, & Thompson, 1988; Smith & Shaffer, 2000). Further, if participants found the specific event frame easier to imagine than the general event frame, one might conclude that the perceived likelihood of alternatives to the specific event was perceived as significantly greater than alternatives to the general event in light of ease of imagination research (e.g., Sherman, Cialdini, Schwartzman, & Reynolds, 1985). Any factor that affects the perceived normality of an event and its features is also likely to have an indirect effect on counterfactual processing. Thus, the notion that general and specific event frames lead directly to different frequencies of counterfactual responses remains somewhat inconclusive.

With respect to the assumptions of norm theory, an additional problem emerges when employing different written-scenario frames of an event (as employed by Petrocelli & Sherman, 2005) to examine reactions to general and specific events. According to norm theory, the perceived normality of event-features plays an essential role in one's reactions to the event. If a general frame of an event, by its very nature, increases the perception that the event is more frequent (e.g., "Thousands of depressed people overdose on drugs each year."), relative to that produced by a specific case of the same event (e.g., "After battling depression for years, he overdosed on drugs."), the general frame of the event essentially increases the event's normality. Thus, events framed in a general way may result in fewer counterfactual thoughts simply because they reduce the abnormality and salience of mutable features. In order to contrast reactions to general

and specific events, perceivers need to consider outcomes that do not appear to differ in their implied frequency. Therefore, each of the proposed experiments was designed to present participants with general or specific events that vary only in the nature of the information that is presented (i.e., specificity) and not in how frequent the outcomes are portrayed to occur.

Finally, the Petrocelli and Sherman (2005) experiment paid no attention to the role of pre-event expectations. Consistent with Sherman et al.'s (1999) dual-process account of reactions to general and specific events, pre-event expectancies should play a more important role in people's judgments of general events. Thus, when feasible, the current experiments (Experiments 1, 2, 4, and 5) include measures of pre-event expectancies.

Overview of Experiments

Five experiments (and a follow-up experiment) were designed to examine whether or not people respond to specific events with counterfactual responses more frequently than they do to general events and whether or not their judgments rely more on their pre-event expectations when evaluating general events. Also of interest is whether or not these differences in counterfactual responses and reliance on pre-event expectations serve as mechanisms by which the type of event shapes an individual's affective, evaluative, or behavioral reactions to the event.

Experiment 1 attempted to do this by visually presenting participants with either general or specific results of a simulated competition between two targets. Experiment 2 attempted to extend the current conceptualization to a person's judgments of their own subjective confidence, by exposing participants to global or specific feedback

information regarding their performance on a task. Experiment 3 was designed to investigate the impact of two different types of counterfactuals on event reactions, independent of the general and specific distinction, namely, upward counterfactual responses and downward counterfactual responses (i.e., mentally simulated alternatives that improve or worsen reality respectively; Markman et al., 1993). Finally, Experiments 4 and 5 examined the current hypotheses using actual events and betting on the outcomes of future events. Experiment 4 provided participants with either global or specific feedback about their actual performance on a task and asked them to place a bet on the outcome of a future event. Experiment 5 asked participants to perform a similar task, but involved actual events observed by specific events condition participants, general information about the events received by general events condition participants, and thought-listing statements by others in addition to general information about the events received by “general event + spoon-fed thoughts” condition participants. The follow-up experiment to Experiment 5 examined the possibility that *counterfactual thought confidence* also mediates the relationship between event type and decisions regarding similar, future events.

General Hypotheses

Four general hypotheses applied to each of the proposed experiments. First, it was hypothesized that counterfactual thoughts would emerge more frequently in response to specific events than to general events. This hypothesis is consistent with Sherman et al.’s (1999) use of norm theory, which argued that specific events tend to increase one’s focus and attention toward mutable features more so than do general events.

Second, this cognitive processing difference is believed to result in different comparison cases for the two types of events. Comparison cases for judging specific events may be largely the result of post-event counterfactual processing, whereas comparison cases for judging general events may be based on pre-event expectations (Sherman et al., 1999). Thus, the relative frequency of upward and downward counterfactual responses to an event was expected to be a stronger predictor of post-event judgments than pre-event expectations for specific event condition participants, but in experiments that permitted the measurement of pre-event expectations (Experiments 1, 2, 4, and 5) it was expected that these expectations would be a better predictor of post-event judgments than counterfactual response frequency for general event condition participants. Because it was hypothesized that a different factor (expectancies versus counterfactuals) should have operated depending on the type of event (general versus specific), two separate interaction effects were also expected to emerge in each experiment that permitted the measurement of pre-event expectations (Experiments 1, 2, 4, and 5) such that: 1) the relationships between pre-event expectations and the dependent variables were stronger for general event condition participants than for specific event condition participants; and 2) the relationships between counterfactual frequency and the dependent variables were stronger for specific event condition participants than for general event condition participants.

The standard of comparison that people employ can very much influence the cognitive, emotional, and behavioral reactions that they have toward an event. Thus, a third hypothesis was drawn such that the link between the type of event (general or

specific) and reactions to the event were expected to be mediated by the relative frequency of upward and downward counterfactual responses.

Finally, each of the experiments proposed included conditions whereby participants were not asked to list their thoughts. The effect of the event manipulation on the dependent variables was expected to occur regardless of whether participants were asked to list their thoughts after being exposed to general or specific event information. This examination is relevant to whether or not counterfactual thinking, in response to general or specific event information, is a spontaneous activity. According to Roese, Sanna, and Galinsky (2005), counterfactual thinking is similar to other thought processes that rely on semantic memory's abstract generalizations about the world. As such, sometimes counterfactual thinking may act as an automatic process and at other times an intentional and controlled process (also see Goldinger, Kleider, Azuma, & Beike, 2003).

Previous accounts of the spontaneity of counterfactual thinking (e.g., Markman et al., 1993) have measured spontaneous counterfactualizing by the presence of counterfactuals in thought-listing tasks. However, it may be that the very act of listing one's thoughts increases the likelihood of engaging in counterfactual thinking. In previous experiments, demand characteristics may also be of some concern. Few empirical studies have directly investigated whether or not the effects of counterfactual responses are present even when participants are not directly asked to list their thoughts. Only from an observation of the same effects for both participants who do and do not list their thoughts (i.e., no main effect for thought-listing condition) can it be inferred that counterfactual responses, and their mediating effects, emerge spontaneously.

CHAPTER 2 – EXPERIMENT 1:

GENERAL AND SPECIFIC MINIATURE GOLF EVENTS

The purpose of this first experiment was to examine: 1) whether or not counterfactual thinking occurs more frequently in response to specific events than to general events; 2) whether or not people rely more on pre-event expectations for judging general events than they do for judging specific events; and 3) whether or not counterfactual responses mediate the relationship between the type of event and subsequent judgments. Importantly, the current experiment was designed to visually present participants with general or specific event information. This method should address the normality criticism of the Petrocelli and Sherman (2005) study (described above), and more directly address the types of general and specific cases about which Sherman et al. (1999) first theorized.

Overview of Experiment

Participants were asked to view a pre-recorded video-game presentation of a simulated 9-hole miniature golf competition between an Indiana University (IU; in-group) undergraduate and a Purdue University (PU; out-group) undergraduate. Before learning more about the competition, participants reported their pre-event expectations. Participants were randomly assigned to a general or specific event condition in which they were exposed to general or specific information about the competition. In addition, participants were randomly assigned to one of four different event trajectories (near comeback, blown lead, last-hole defeat of even match, or back-and-forth lead), all of which the IU undergraduate ultimately lost by a single stroke. Half of the participants were instructed to list their thoughts after each of the nine holes, whereas the other half of

the participants were not instructed to do so. At the conclusion of the competition, all participants reported how pleased they were with the IU golfer, how skilled they believed the IU golfer to be, the perceived likelihood that the IU golfer would win in a rematch, the likelihood that they would bet on the IU golfer to win in a rematch, and how much they would bet on the IU golfer to win in a rematch.

Hypotheses

Seven separate hypotheses were tested in Experiment 1:

Hypothesis 1: Participants assigned to the specific event condition were expected to generate a greater number of upward counterfactual thoughts in response to the event than were participants assigned to the general event condition. That is, a main effect of type of event on the number of upward counterfactuals generated in response to the event was expected to emerge. This hypothesis is consistent with Sherman et al.'s (1999) use of norm theory, which argued that specific events tend to increase one's attention toward mutable features more than general events do, as well as the Petrocelli and Sherman (2005) experimental findings that support this notion.

Hypothesis 2: Participants assigned to the blown lead, the last-hole defeat of even match, and the back-and-forth lead trajectory conditions were expected to generate a greater number of upward counterfactual thoughts in response to the event than were participants assigned to the near comeback trajectory condition. That is, a main effect of event trajectory on the number of upward counterfactuals generated in response to the event was expected to emerge. This hypothesis is in accordance with evidence in support of the temporal order effect (Kahneman & Miller, 1986; Walsh & Byrne, 2004), which suggests that, when no causal relation between events exists people hold a preference for

mutating events that have occurred more recently in time. For example, in football, a missed field-goal is more likely to be counterfactualized if it occurs in the fourth quarter than if it occurs in the first quarter. Miller and Gunasegaram (1990) have argued that this occurs because people tend to perceive an earlier event of a temporal chain of events as a fact or a “given,” and are more likely to counterfactualize later events because their causal potency is relatively greater as a result of alternative outcomes coming to mind more readily. Accordingly, participants assigned to the blown lead, the last-hole defeat of even match, and the back-and-forth lead trajectory conditions were expected to perceive the IU golfer as losing the competition due to things that occurred toward the end of the competition. Thus, these participants were more likely to engage in counterfactual thinking. Participants assigned to the near comeback trajectory condition were expected to perceive the IU golfer as losing the competition due to things that occurred during the earlier stages of the competition. However, these earlier features of the event may be perceived as relatively less causal as they are “presupposed or taken for granted” (Miller & Gunasegaram, 1990, p. 1113), thus resulting in relatively fewer counterfactual responses by near comeback trajectory condition participants.¹

Hypothesis 3: Participants assigned to the specific event condition were expected to report being less pleased with the IU golfer, but rate the IU golfer’s skill more highly, report a greater likelihood that the IU golfer would win in a rematch, report a greater likelihood that they would bet on the IU golfer to win in a rematch, and risk a greater bet on the IU golfer to win in a rematch than participants assigned to the general event condition. In other words, a main effect of type of event on each of the five dependent variables was expected to emerge. This hypothesis was based on the assumption that

Hypothesis 1 would be supported. If in fact specific event condition participants focus more on how the IU golfer could have or should have won the competition than do general event condition participants, they should correspondingly perceive the IU golfer to be more skilled and worthy of betting on to win in a rematch. Because the IU golfer lost the competition, despite being perceived as more skilled than the PU golfer, specific event condition participants were expected to be less pleased with the IU golfer's performance. This hypothesis (regarding satisfaction with the IU golfer's performance) is also consistent with earlier research that has demonstrated affective contrast effects of upward counterfactual thinking (i.e., negative affect brought about by thinking of how things could have been better; see Markman et al., 1993; Markman, Gavanski, Sherman, & McMullen, 1995; Medvec, Madey, & Gilovich, 1995; Roese, 1994).

Hypothesis 4: Participants assigned to the blown lead, the last-hole defeat of even match, and the back-and-forth lead trajectory conditions were expected to report being less pleased with the IU golfer, but rate the IU golfer's skill more highly, report a greater likelihood that the IU golfer would win in a rematch, report a greater likelihood that they would bet on the IU golfer to win in a rematch, and risk a greater bet on the IU golfer to win in a rematch than participants assigned to the near comeback trajectory condition.

In other words, a main effect of event trajectory on each of the five dependent variables was expected to emerge. This hypothesis was based on the assumption that Hypothesis 3 would be supported. If in fact the blown lead, the last-hole defeat of even match, and the back-and-forth lead trajectory condition participants focused more on how the IU golfer could have or should have won the competition than did near comeback trajectory condition participants, they should have been correspondingly less pleased with the IU

golfer's performance; yet they should have perceived the IU golfer as more skilled and worthy of betting on to win in a rematch.

Hypothesis 5: No main effect of thought-listing on any of the dependent variables was expected to emerge from the data. In accordance with Roese et al.'s (2005) and Goldinger et al.'s (2003) arguments, counterfactual thinking was expected to act as an automatic process in the current experiment. That is, counterfactual responses (especially those by specific event condition participants) were expected to emerge even when participants were not deliberately asked to list their thoughts. If so, then asking or not asking participants to list their thoughts should not have affected the data. However, it was important to include the thought-listing manipulation in the current experiment to determine whether or not people spontaneously generate counterfactuals and whether or not the type of event (general or specific) affects post-event judgments even when participants are not asked to list their thoughts about the event.

Hypothesis 6: The relative frequency of upward counterfactual responses to an event was expected to be a stronger predictor of post-event judgments than were pre-event expectations for specific event condition participants, but pre-event expectations were expected to be stronger predictors of post-event judgments than was upward counterfactual response frequency for general event condition participants. This hypothesis was based on the notion that the cognitive processing difference (stated in Hypothesis 1) resulted in different comparison cases for the two types of events. Sherman et al. (1999) argued that comparison cases for judging specific events may be largely the result of post-event counterfactual processing, whereas comparison cases for judging general events may be based on pre-event expectations. Furthermore, it is well

established that the standard of comparison that people employ can very much influence the cognitive, emotional, and behavioral reactions that they have toward the event (e.g., see Biernat & Manis, 1994; Schwarz, 1999).

Hypothesis 7: The relationships between the type of event (general or specific) and post-event judgments were expected to be statistically mediated by the relative frequency of upward counterfactual responses. If comparison cases for specific events were constructed through the mutation of specific event information, and if comparison cases for general events were constructed on the basis of pre-event expectations, counterfactuals should have mediated the relationships between the type of event and post-event judgments. Because it was hypothesized that a different factor (expectancies versus counterfactuals) should have operated depending on the type of event (general versus specific), two separate interaction effects were also expected to emerge such that: 1) the relationships between pre-event expectations and the dependent variables were stronger for general event condition participants than for specific event condition participants; and 2) the relationships between counterfactual frequency and the dependent variables were stronger for specific event condition participants than for general event condition participants.

Method

Participants

A total of 370 undergraduate students, enrolled in psychology courses at Indiana University, participated in Experiment 1 for partial fulfillment of course credit. Experimental sessions involved a maximum of six participants.

Procedure

Upon arrival, participants were greeted by a laboratory assistant who gave them a brief oral introduction to the experiment and escorted them to a cubicle equipped with a personal computer. The experiment was introduced as a study of “what people think about as they watch sports.” All experimental materials were presented using MediaLab v2004 Research Software (Jarvis, 2004). The instructions of the experiment were self-paced, and participants advanced the instructions by pressing the space bar or a response key.

Participants were asked to imagine that they were about to view a simulation of a nationally televised, 9-hole miniature golf competition. In addition, they were asked to imagine that the competition was between an Indiana University (IU; in-group) undergraduate on the IU golf team and a Purdue University (PU; out-group) undergraduate on the PU golf team, and that the proceeds of the competition go to charity. They were then informed that they would be asked to report their judgments based on what they learn about the competition.

Before learning more about the competition, participants were asked to report their expectations on four items. Specifically, participants rated how skilled they expected the IU golfer to be on a 7-point scale anchored at *very low skill* (1) and *very high skill* (7), as well as how likely they thought it was that the IU golfer would win the competition and how likely they would be to bet that the IU golfer would win the competition on 7-point scales anchored at *not at all likely* (1) and *extremely likely* (7), and how many dollars they would be willing to bet that the same IU golfer would win the

competition if they were given \$100 for participating in the experiment (where the minimum bet was \$10).

Each participant was then randomly assigned to one of two experimental conditions (specific event or general event) and learned about each miniature golfer's performance on each of the nine holes of the competition. To increase overall attentiveness to the experimental protocol, and to provide a useful check of whether or not participants followed instructions, participants were asked to report the score of the competition after each hole.

Specific event condition. For each hole, participants in the specific event condition viewed the course (see Figure 1.1) and then viewed each of the golfer's strokes for each of the nine holes. During the first hole, participants viewed a video sequence of both golfers easily making par (completing the hole with the standard expected number of shots) without anything abnormal occurring during play.

Subsequent holes displayed what may be perceived by participants as poor shots made by the IU golfer, lucky shots made by the PU golfer, or normally expected performance by both players. Some holes were won by the IU golfer and others were won by the PU golfer. However, the golfers were presented as making par, or one shot above or below par on each hole. Participants were randomly assigned to view one of four different trajectory sequences of clips of the competition, all of which had the IU golfer ultimately losing the competition by one stroke. One sequence displayed the PU golfer with a relatively larger lead during the first two-thirds of the competition than the last third of the competition (*near comeback*); one sequence displayed the IU golfer with a lead in the first two-thirds of the competition (*blown lead*); one sequence displayed both

golfers in an even competition the entire way through until the final hole (*last-hole defeat of even match*); and one sequence displayed a back-and-forth lead between the two golfers until the final hole (*back-and-forth lead*); see Figure 1.2 for the design of each trajectory. After viewing the play of each hole, each golfer's number of strokes was displayed on a scoreboard for 10 seconds. Directly following the ninth and final hole, participants learned that the IU golfer had lost the competition by one stroke.

General event condition. Participants in the general event condition viewed the very same video sequence as participants in the specific event condition, but only for the first hole (that is, they did not view each of the golfer's strokes for the remaining eight holes). For the remaining eight holes, participants in the general event condition viewed only the course with the golfers positioned at the tee (start point) for five seconds. Directly following each hole, the scoreboard was displayed for 10 seconds. The scoreboard listed the same number of strokes for each hole as it did for participants in the specific event condition (one of four different trajectory sequences). As in the specific event condition, participants learned that the IU golfer had lost the competition by one stroke.

Thought-listing task. Following each hole, half of the participants in both conditions were asked to complete a 1-minute thought-listing task. Specifically, participants were asked to record any thoughts they had during or after what they previously viewed by typing one thought per screen (maximum of three thoughts). In order to assess whether or not the same expected effects occur even when people are not directly asked to list their thoughts, the other half of the participants were not asked to complete the thought-listing task after each player's information was received. However,

their participation in the experiment was delayed (with a countdown displayed on the screen) for the same amount of time that would have elapsed had they been asked to list their thoughts after each hole (i.e., 1-minute). During this time delay, it was explained to these participants that the computer was loading the next frames of the experiment.

Dependent variables. At the conclusion of the ninth hole, and after participants become aware of the final outcome, participants were asked to report how pleased they were with the IU golfer's performance on a 7-point scale anchored at *not at all pleased* (1) and *extremely pleased* (7), as well as how skilled they believed the IU golfer to be on a 7-point scale anchored at *very low skill* (1) and *very high skill* (7). Three additional questions asked participants to report how likely they would be to bet that the same IU golfer would win in a rematch against the same PU golfer and how likely they would be to bet that the same IU golfer would win a rematch against the same PU golfer on 7-point scales anchored at *not at all likely* (1) and *extremely likely* (7), as well as how many dollars they would be willing to bet that the same IU golfer would win in a rematch against the same PU golfer (using a \$10 to \$100 scale). These final ratings served as the primary dependent variables of the experiment. Participants were then debriefed and thanked for their participation.

Design and Analyses

Experiment 1 employed a 2 (type of event: general vs. specific) \times 4 (event trajectory: near comeback, blown lead, last-hole defeat, back-and-forth) \times 2 (thought-listing: yes vs. no) complete between-groups factorial design. Dependent variables, and the influences of the type of event, thought-listing instructions, pre-event expectancies, and counterfactuals, were examined using a combination of analysis of variance

(ANOVA) statistics as well as correlational and hierarchical multiple regression procedures.

Results

Data from a total of 24 participants (roughly 1.5 participants per the 16 conditions) were discarded from all of the analyses due to incomplete data as a result of computer failure, failure to complete the experiment by their own choice, or failure to follow directions. Participants in the specific events plus thought-listing condition were a bit more likely to fail to complete the experiment (perhaps this was due to the relative length of the task). Thus, data from a total of 346 participants were used in the analyses that follow.

Preliminary Analyses

Importantly, participants in the two event type conditions (general and specific) did not differ in their pre-event expectations about the golf competition (see the top half of Table 1.1). That is, regardless of event type condition, participants held relatively equal expectations about the IU golfer's skill and likelihood of winning the competition, as well as their likelihood to bet on the IU golfer to win the competition and how much money they would be willing to place as a bet. Participants also did not differ in their expectations with respect to event trajectory condition, thought-listing condition, or the possible interactions between these variables and with event type.

Intercoder Agreement of Thought-Listings

A total of 3,749 thoughts were listed by participants in the thought-listing condition. Each thought-listing response was coded by two separate coders as a counterfactual response (upward or downward) or a non-counterfactual response.

Neither of the coders coded a single thought-listing response as a downward counterfactual. The overall agreement between the two coders was 97.46%. Smith (2000) recommended that satisfactory coder agreement also be evidenced by intercoder correlations of .85 or higher for Spearman's ρ and a Kappa index of at least .80. With respect to these indices, the overall agreement was not as strong, Spearman's $\rho = .71, p < .001$, Kappa = .71, $p < .001$. However, other researchers (McClelland, Atkinson, Clark, & Lowell, 1953; Smith, Feld, & Franz, 1992) have suggested that a corrected category agreement index be computed by dividing the product of two and the number of agreements between coders on a category being present by the sum of the number of cases scored as that category by coder 1 and the number of cases scored as that category by coder 2. The category agreement index for counterfactual responses was .72 whereas the category agreement index for non-counterfactual responses was .98.

Due to this suboptimal level of agreement between coders, especially for counterfactual responses, a third coder was used to resolve the disagreements. A representative selection of counterfactual and non-counterfactual responses submitted by participants is displayed in Table 1.2.

Upward Counterfactuals

The average frequency of upward counterfactuals listed by participants in the thought-listing condition was 1.39. This total was out of 27 possible thoughts listed (a maximum of three thoughts could be listed following each of the nine holes). At first glance the average frequency of counterfactuals may seem low. However, upward counterfactuals are more likely to emerge in response to undesirable events as opposed to desirable ones (Gilovich, 1983; Markman et al., 1993, 1995). Each hole of the

competition, in and of itself, can be regarded as an event, and the IU golfer either won or tied half of these holes (regardless of the trajectory). Thus, the frequency of upward counterfactuals listed by participants in the thought-listing condition was not so infrequent.

As stated earlier, participants assigned to the specific event condition were expected to generate a greater number of upward counterfactual thoughts in response to the event than were participants assigned to the general event condition (Hypothesis 1). This hypothesis was supported by a main effect of event type on the frequency of upward counterfactuals listed by participants, such that specific event condition participants listed a greater number of upward counterfactuals ($M = 1.95$, $SD = 1.87$) than did general event condition participants ($M = .86$, $SD = .93$), $F(1, 167) = 21.58$, $p < .001$.

Anderson (2003) suggested that the influence of counterfactual thinking on judgment may be more complex than the simple frequency of counterfactual thoughts generated in response to an event. For instance, the potency of counterfactual thinking may lie in the subjective ease of counterfactual generation, the amount of time that counterfactuals occupy one's thinking, or the overall weight placed on counterfactual thoughts relative to the weight of other thoughts. In this light, a measure of the degree to which upward counterfactual thoughts dominated a participant's set of cognitive responses is of greater interest than the simple frequency. Thus, analyses involving upward counterfactual frequency were conducted using a corrected proportion of upward counterfactuals. To compute the corrected proportion for each participant, the overall proportion of upward counterfactuals was computed by simply dividing the number of upward counterfactuals by the total number of thoughts listed. This proportion was then

converted to a ratio that represented the expected number of upward counterfactuals to thoughts given no information about the type of event. A Bayesian corrected proportion was then computed (number of upward counterfactuals listed + 1 / number of total thoughts listed + b ; where the weight, b , reflected a ratio equivalent to the average proportion of counterfactuals of the entire sample. In other words, 1 divided by the proportion of counterfactuals. In the current experiment, the mean proportion of upward counterfactuals across the entire was .0625; thus, $b = 16$. According to this measure of upward counterfactual frequency, specific event participants listed a greater proportion of upward counterfactuals ($M = .08$, $SD = .05$) than did general event participants ($M = .05$, $SD = .03$), $F(1, 167) = 21.55$, $p < .001$. Although all subsequent analyses examining upward counterfactual frequency as a moderator or mediator of other effects were computed using the Bayesian corrected proportion, the term “upward counterfactual frequency” is retained in the report of these analyses for ease of presentation.

It was also predicted that participants assigned to the blown lead, the last-hole defeat of even match, and the back-and-forth lead trajectory conditions would generate a greater number of upward counterfactual thoughts in response to the event than would participants assigned to the near comeback trajectory condition (Hypothesis 2). However, as revealed by a 2 (type of event) \times 4 (event trajectory) ANOVA, trajectory failed to affect the frequency of upward counterfactual responses, $F(3, 161) = 1.74$, ns ; nor did it interact with event type to affect this frequency, $F(3, 161) = 1.03$, ns . Although no statistical difference was observed, the overall trend was actually opposite to the pattern expected. That is, participants in the near comeback condition listed a greater average of upward counterfactual responses ($M = .07$, $SD = .06$) than any of the other

trajectory conditions: blown lead ($M = .05$, $SD = .03$); last-hole defeat of even match ($M = .06$, $SD = .04$); back-and-forth lead ($M = .05$, $SD = .03$). Examination of the trajectories (see Figure 1.2) shows that the two trajectories with the greatest frequency of upward counterfactuals (near comeback and last-hole defeat) also have a greater frequency of ties and a smaller frequency of wins in the earlier holes of the competition in comparison to the two trajectories with the smallest frequency of upward counterfactuals (blown lead and back-and-forth lead). This aspect of the event trajectories (a greater number of near wins for the IU golfer in the earlier stages of the competition in the near comeback and last-hole defeat trajectory conditions) may have increased the likelihood that participants in these conditions were to make reference to earlier holes of the competition (e.g., “He should have been more focused in the early holes.”) as well as to the later holes when asked to list thoughts following the presentation of later holes (thus, increasing their total frequency of counterfactual responses). An inspection of the thought-listings following the last three holes supports this notion. Of the upward counterfactual responses listed by participants in the near comeback trajectory condition following the last three holes, 44% of their counterfactuals clearly referenced things that could have or should have occurred differently during the earlier stages of the competition. This figure was 14% for the last-hole defeat trajectory, 14% for the blown lead trajectory, and 10% for the back-and-forth lead trajectory. In a chi-square analysis of the full 8-cell table (counterfactuals that referenced earlier holes vs. counterfactuals that did not reference earlier holes for each of the four trajectories), these frequencies did not appear to be significantly different, $\chi^2(3, N = 40) = 4.42$, *ns*. However, when comparing the near comeback condition to all other trajectories in a 4-

cell test (only the frequency of counterfactuals that referenced earlier holes), the frequencies did appear to be significantly different, $\chi^2(1, N = 40) = 4.34, p < .05$. In this respect, it is also important to note that the trajectory conditions did not differ in their mean frequencies of upward counterfactuals following the last three holes of the competition, $F(3, 154) = 1.09, ns$.

Satisfaction with Performance and Perceptions of the IU Golfer's Skill

Two separate 2 (type of event) $\times 4$ (event trajectory) $\times 2$ (thought-listing condition) ANOVAs were conducted for satisfaction with the IU golfer's performance and perceptions of the IU golfer's skill at the conclusion of the competition. As stated earlier, participants assigned to the specific event condition were expected to report being less pleased with the IU golfer, but rate the IU golfer's skill more highly (Hypothesis 3, part 1). This hypothesis was based on the idea that the upward counterfactual responses would lead to an affective contrast effect for their satisfaction with the IU golfer's performance but not for their perceptions of the IU golfer's skill (because it is not an affective dimension). However, the data displayed in the bottom half of Table 1.1 do not support the expected affective contrast effect for satisfaction with the IU golfer's performance. Instead, the data suggest affective assimilation effects of event type on satisfaction and perceived skill, such that the group of participants that counterfactualized the most (i.e., specific event) reported greater satisfaction and perceptions of greater skill for the IU golfer than the general event participants.

With regard to satisfaction and perceived skill, it was also predicted that participants assigned to the blown lead, the last-hole defeat of even match, and the back-and-forth lead trajectory conditions would report being less pleased with the IU golfer,

but rate the IU golfer's skill more highly (Hypothesis 4, part 1). A main effect of trajectory on satisfaction was observed $F(3, 330) = 5.67, p < .01$, but a main effect of trajectory on perceived skill was not, $F(3, 330) = 1.90, ns$. Similar to the pattern of means for counterfactual frequency by event trajectory, the pattern of means for satisfaction by trajectory was opposite to that originally expected. Rather than being the least pleased with the IU golfer's performance, participants assigned to the near comeback condition reported being more pleased ($M = 4.22, SD = 1.41$) than did participants assigned to the blown lead condition ($M = 3.14, SD = 1.80; t(330) = 4.31, p < .001$), the last-hole defeat condition ($M = 3.59, SD = 1.73; t(330) = 2.55, p < .05$), and the back-and-forth lead condition ($M = 3.66, SD = 1.63; t(330) = 2.27, p < .05$). All of the additional pairwise contrasts failed to reveal any additional statistically significant differences between the four trajectory conditions for satisfaction with the IU golfer's performance.

However, the main effects of event type and trajectory for satisfaction were qualified by an interaction between event type and trajectory, $F(3, 330) = 3.23, p < .05$. As is evident in Figure 1.3, only when the trajectory of the event was one of a near comeback was the satisfaction of specific event condition participants ($M = 4.67, SD = 1.17$) greater than that of their general event condition counterparts ($M = 3.74, SD = 1.50, t(330) = 2.66, p < .01$). Specific and general event condition participants did not differ significantly in their satisfaction with the IU golfer in any of the other three trajectory conditions. The main effect of event trajectory and its interaction with event type, although not expected from the outset of the experiment, provides further support for the notion that an affective assimilation effect occurred for participants assigned to

the specific event condition. More specifically, this assimilation effect appears to have occurred for participants assigned to the specific event/near comeback cell (the same condition that led to the most counterfactualizing), especially toward the end of the competition.

It is also important to note that the group of null effects included the absence of main effects of thought-listing on satisfaction with the IU golfer's performance and his perceived skill. In addition, thought-listing condition did not interact significantly with event type or event trajectory for these dependent variables. Thus, Hypothesis 5 was supported in this respect. No other statistically significant effects were observed for these dependent variables.

Confidence Regarding a Rematch

Three separate 2 (type of event) \times 4 (event trajectory) \times 2 (thought-listing condition) ANOVAs were conducted for the three measures of confidence in the IU golfer as it pertained to a rematch with the same PU golfer. As stated in the second part of Hypothesis 3, participants assigned to the specific event condition were expected to report a greater likelihood that the IU golfer would win in a rematch, report a greater likelihood that they would bet on the IU golfer to win in a rematch, and risk a greater bet on the IU golfer to win in a rematch than were participants assigned to the general event condition. This hypothesis was supported for each of the dependent variables (see the bottom half of Table 1.1).

However, the main effect of event type on the perceived likelihood that the IU golfer would win in a rematch was qualified by an unexpected event type by thought-listing condition interaction, $F(1, 330) = 4.38, p < .05$. When participants were not asked

to list their thoughts following each hole of the competition, specific event participants reported a greater perceived likelihood of an IU win in a rematch ($M = 4.87$, $SD = 1.09$) than did general event participants ($M = 4.23$, $SD = 1.02$), $t(330) = 3.18$, $p < .01$. No difference was found between specific event participants ($M = 4.46$, $SD = 1.20$) and general event participants ($M = 4.45$, $SD = 1.23$) when they were asked to list their thoughts, $t(330) = .05$, ns . Further pairwise contrasts revealed that the two means among the general event participants did not differ ($t(330) = -1.25$, ns), but that the two means among the specific event participants did reach a marginal difference $t(330) = 1.83$, $p < .10$. This overall pattern of data for the perceived likelihood that the IU golfer would win in a rematch may suggest that people rely even more on something other than counterfactual responses (e.g., pre-event expectations) when reacting to general event information, especially when they are not explicitly asked to list their thoughts about the event. On the other hand, this pattern of data was not found among the other two confidence variables, and thus, only moderate confidence in this notion can be supported.

No other main effects or interactions were observed for the three confidence variables. Therefore, the second part of Hypothesis 4 regarding the main effect of event trajectory on the confidence variables, failed to receive support.

Moderation of Pre-Event Expectations and Upward Counterfactuals

The final two hypotheses regarding moderation of pre-event expectations and moderation and mediation of post-event counterfactual responses were examined using hierarchical multiple regression analyses according to the procedures recommended by Cohen and Cohen (1983). In each of these analyses, the three confidence measures served as the dependent variables.

Pre-event expectancy and upward counterfactual frequency were tested as moderators of the relationship between event type and the three confidence measures in six separate hierarchical multiple regression models using the procedures recommended by Cohen and Cohen (1983). To simplify the remainder of the current and subsequent experimental analyses, the pre-event expectancy scores were transformed to *z*-scores and summed to create a composite pre-event expectancy variable (each of the four pre-event expectancy measures correlated significantly, average $r = .32$). All subsequent analyses employed event type as a dummy coded variable (general event = 0; specific event = 1) and continuous variables were centered. For each hierarchical multiple regression model, event type and one of the proposed moderators were entered in step 1 and their interaction term was entered in step 2.

Of the six tests of moderation, only one was supported statistically; pre-event expectancy moderated the relationship between event type and perceived likelihood of the IU golfer to win in a rematch. More specifically, the two main effects of event type ($\beta = .11$, $t(343) = 2.04$, $p < .05$) and pre-event expectancy ($\beta = .20$, $t(343) = 3.87$, $p < .01$) on perceived likelihood of the IU golfer to win in a rematch ($R^2 = .05$, $F(2, 343) = 10.25$, $p < .001$) were qualified by an interaction between event type and pre-event expectancy ($\beta = -.16$, $t(342) = -2.18$, $p < .05$; $\Delta R^2 = .02$, $\Delta F(1, 342) = 4.75$, $p < .05$). Simple slope analyses were examined according to the procedures recommended by Aiken and West (1991). Thus, the simple slopes were plotted and examined at one standard deviation above and below the mean of pre-event expectancy (see Figure 1.4). The simple slope analysis showed that the perceived likelihood of the IU golfer to win in a rematch was greater in the specific condition than the general condition when pre-event expectancies

were relatively low $\beta = .22$, $t(342) = 3.04$, $p < .01$. However, as expected, the perceived likelihood of the IU golfer to win in a rematch increased with pre-event expectancies significantly only when exposed to the general outcome of the competition, $\beta = .43$, $t(342) = 4.65$, $p < .01$. No other simple slopes were statistically significant.

Mediation of Upward Counterfactuals

Next, mediation analyses were examined with the current data according to the procedures outlined by Baron and Kenny (1986). In each of these analyses, the three confidence measures served as the dependent variables. As stated earlier, upward counterfactuals should mediate the relationships between event type and post-event judgments (Hypothesis 7).

First and foremost, there were three separate relationships for upward counterfactual frequency to possibly mediate: 1) the relationship between event type and perceived likelihood of the IU golfer to win in a rematch, $\beta = .12$, $t(344) = 2.30$, $p < .05$; 2) the relationship between event type and perceived likelihood that one would place a bet on the IU golfer to win in a rematch, $\beta = .15$, $t(344) = 2.82$, $p < .01$; and 3) the relationship between event type and hypothetical bet on the IU golfer to win in a rematch, $\beta = .11$, $t(344) = 1.97$, $p < .05$.

Upward counterfactual frequency was tested as a mediator of the relationships between event type and the three dependent variables (see Figure 1.5). As indicated earlier in a one-way ANOVA, upward counterfactual frequency was significantly associated with the specific event condition, $\beta = .34$, $t(167) = 4.64$, $p < .001$. As displayed in Figure 1.6, when both event type and upward counterfactual frequency were entered into the regression model simultaneously, event type was no longer a significant

predictor of any of the three dependent variables. Yet, upward counterfactual frequency was a significant predictor of two of the three variables (i.e., perceived likelihood that one would place a bet and hypothetical bet on the IU golfer to win in a rematch). Modified Sobel (1982) tests showed that the reduction in the effect of event type on perceived likelihood of the IU golfer to win in a rematch was not a significant reduction, $z = .56, ns$. However, the reductions in the effect of event type on perceived likelihood that one would place a bet on the IU golfer to win in a rematch, as well as on hypothetical bet on the IU golfer to win in a rematch, were statistically significant ($z = 2.15, p < .05$; $z = 2.25, p < .05$ respectively). Each of these final three mediational models was recomputed controlling for pre-event expectations in an earlier step. The pattern of results was virtually the same; counterfactuals still mediated the relationships between event type and two of the DVs (likelihood of betting and hypothetical bet amount).

Pre-event expectancies as a mediator of the relationships between event type and the dependent variables was not examined due to the fact that a major criterion of Baron and Kenny (1986) would be violated, namely a causal relationship between the independent variable (event type) and the proposed mediator (pre-event expectancy). It was shown earlier that there was no causal relationship between event type and pre-event expectancies, nor should one have been expected. In fact, in the current and all subsequent experiments, pre-event expectancies were measured before exposing participants to the event information. Thus, no statistical argument can be made for pre-event expectations as a mediator. However, it is certainly possible for an individual to re-access or revise their initial expectations when forming judgments about a recent event, or when asked to form expectations about a similar, future event. If observers of general

event information do rely on their pre-event expectancies as a comparison case to judge recently observed and subsequent events, their pre-event expectancies should at least statistically reduce any effect that the type of event (general or specific) has on judgments and future expectations. Yet, the paradigm used in the current and all subsequent experiments did not include a measure of the extent to which participants re-access or revised their initial expectations.

Discussion

Reactions to events are believed to be partially determined by the comparison case that one uses as a standard or reference point. Furthermore, the comparison cases used to form judgments about general events may be quite different from the comparison cases used to form judgments about specific events. As the current experiment demonstrated, people may not only have different reactions to general and specific events, but they may also differ in their perceptions of the probability of particular outcomes regarding similar, future events. The current experiment is the very first to demonstrate that counterfactual responses are more likely to emerge in response to specific events than they are to general events. Apparently, people may also differ with respect to their perceived likelihood to take risks as well as how risky they expect themselves to be as a function on the type of event (general or specific) to which they have been previously exposed.

The data of Experiment 1 also suggest that the relationship between the type of event and satisfaction with its outcome is more complex than first theorized. For instance, the motivation to counterfactualize, whether it be evaluative-comparative or experiential, may influence the overall satisfaction with an event's outcome. The specific

way in which the event unfolds (i.e., event trajectory in the current experiment) also appears to influence reactions to the event. Although the significant effects involving event trajectory were in the opposite direction of what was expected, they may still be explained by the frequency of upward counterfactual that emerged in the specific event condition. Given McMullen's (1997) findings, it seems likely that some of the mental simulation of alternatives to the outcome miniature golf competition was motivated by the experiential mode. McMullen (1997) showed that under some conditions upward counterfactuals can lead to affective assimilation (i.e., positive affect brought about by thinking of how things could have been better). McMullen distinguished between the evaluative-comparative and experiential modes of mental simulation. The use of the evaluative-comparative mode may be adopted simply by a desire to evaluate actual outcomes, whereas the experiential mode may be motivated by a desire to experience the counterfactual simulation itself, as if it were real (as in the case of fantasizing). From McMullen's (1997) experiments, it appears that affective contrast effects tend to result from the evaluative-comparative mode of mental simulation, whereas affective assimilation effects tend to result from the experiential mode of mental simulation. It is possible that counterfactuals in response to the competition were of an experiential nature. If so, this would lead to an affective assimilation effect rather than an affective contrast effect. In any case, it is also important to recognize that the average level of satisfaction reported by specific event condition participants was still below the midpoint of the scale, suggesting that they were still on average more displeased than pleased with the IU golfer's performance, but less displeased than their general event condition counterparts.

Perhaps most important to the current conceptualization of reactions to general and specific events were the moderation, and mediation results. These results suggest that the upward counterfactual thoughts that emerge in response to an event play a more important role in reactions to specific events, whereas pre-event expectancies play a more important role in reactions to general events. It is theorized that these variables play their most important role in shaping the standards of comparison used to form judgments about the events themselves. From the current experiment, it appears that these variables also influence one's expectations about similar, future events, as evidenced by some of the tests of mediation. Yet, the evidence of mediation by way of counterfactualizing specific events attained greater support than did moderation by way of pre-event expectations in response to general events. On the other hand, expectations change in response to direct experience (i.e., new information) as well as disconfirmed expectations (Olson, Roese, & Zanna, 1996). It is possible that in the relative absence of counterfactual thinking, general event condition participants focused more of their attention on the outcome, rather than on more desirable alternatives to reality. If so, perhaps the expectations of general event participants were appropriately adjusted by the highly relevant information they had recently gained when it came to making judgments about a similar, future event. This notion is supported by the relatively moderate expectations and probability estimates of the general event condition participants regarding the rematch (see again Table 1.1).

However, expectations and counterfactuals should matter for reactions to both general and specific events. Certainly no case is made here for the notion that counterfactuals do not affect reactions to general events and that pre-event expectancies do not affect reactions to specific events. Rather, because counterfactuals are more likely

to emerge in response to specific as opposed to general events, counterfactuals are likely to play a larger role in reactions to specific events than in reactions to general events. In the absence of counterfactualized comparison cases, pre-event expectations are likely to remain more integral to the reactions of general events than to the reactions of specific events.

Interestingly, another potential influence on the tendency to counterfactualize features of an event may be the degree to which one experiences failed expectations (i.e., the discrepancy between pre-event expectations and the outcome of the event itself). Wong and Weiner (1981) showed that people are usually more motivated to explain unexpected outcomes than they are expected ones, and Gilovich (1983) demonstrated that people are more likely to counterfactualize unfavorable outcomes than favorable ones. If this was true in Experiment 1, then perhaps the greater the discrepancy between initial expectancies and the outcome, the greater was the tendency to counterfactualize features of the event. If so, this increased tendency may have led to an even greater mediational role of counterfactual thinking. Any such tendency is expected to be especially great for specific events, where observers have readily accessible event features to mutate. Data from Experiments 4 and 5 were more appropriate to examine such notions because they allowed both pre-event expectations and personal outcomes to vary, whereas only pre-event expectations were permitted to vary in Experiments 1, 2, and 3.

A particular limitation of the current experiment may be the inconsistency in the results among the three confidence variables, all of which correlated with each other significantly (average $r = .51$). On the other hand, the dependent variables dealt with people's predictions and their own behavioral intentions to place a bet on a particular

outcome. It is well known from studies on attitude-behavior consistency (e.g., Fazio & Zanna, 1978; Regan & Fazio, 1977; Sherman & Gorkin, 1980; Zanna, Olson, & Fazio, 1981) that consistency is not always found when requesting another person to “put their money where their mouth is,” nor should there be much reason to expect “true” consistency to exist between one’s predicted behaviors and their actual behaviors (e.g., see studies conducted by Sherman, 1980).

Finally, asking people to explicitly list their thoughts following an event may or may not increase their likelihood of counterfactualizing features of the event or the extent to which they think about their thoughts. In any case, the effects of event type on the dependent variables were observed regardless of whether or not participants were asked to list their thoughts. Thus, any effect that event type had on the tendency to either re-access pre-event expectancies or to counterfactualize features of the event appears to have not involved the required listing of thoughts.

Experiment 1 involved reactions to events that participants only observed; that is, participants were not in any way in control of the outcome of the event. It is important to examine the current conceptualization of reactions to general and specific events across other task domains and for events over which people may feel they have some sort of control. This aspect of general and specific events was examined in Experiment 2 (also see Experiments 4 and 5).

CHAPTER 3 – EXPERIMENT 2:

GLOBAL AND SPECIFIC TRIVIA TEST PERFORMANCE FEEDBACK

Do the different cognitive responses that people have toward general and specific cases play roles in estimates of one's confidence in their own skills or in their estimates of their performance for future tasks? Such questions are relevant to the current model being proposed. Of further interest is whether or not it can be empirically demonstrated that these roles stem from different standards of comparison shaped by counterfactual responses to specific event information and by pre-event expectancies for global event information.

Some clues to the answers to such inquiries are provided by gambling studies conducted by Gilovich (1983). Gilovich showed that gamblers tend to discount or explain away their losses, especially when the salience of a “fluke” occurrence precedes the final outcome. Such fluke occurrences are likely to be a focus of attention only for perceivers of specific event information. In fact, perceivers of general event information are typically unaware of abnormal, mutable features present in specific event information. If counterfactual thinking is more likely to occur after receiving specific event information about one's own performance on a task than after receiving global information, a different standard of comparison should be used for each type of feedback (specific or global). Essentially, counterfactual thoughts in response to specific instances may make more salient how successful one could have or should have been. These counterfactual alternatives are believed to be used as standards of comparison for constructing expectations about future global performance on similar tasks as well as global estimates of confidence. As the results of the Gilovich (1983) studies suggest, it is

upward counterfactual thinking following undesirable outcomes that prevents people from using actual outcome information as the standard of comparison for estimates of their own future performance. Rather, people appear to explain away unfavorable outcomes and utilize alternatives to reality as standards of comparison for estimating their abilities. This route may leave a losing individual with a more optimistic sense that their abilities are greater than that which has been demonstrated by previous outcomes. Thus, gamblers may continue to gamble even in the face of frequent and consistent losses.

When receiving specific feedback performance (i.e., following each decision) on a task that involves multiple alternatives, such as a multiple choice trivia test, people may find it quite easy to counterfactualize those instances in which they receive undesirable feedback (i.e., they are told they are incorrect). “I knew I should have selected C” or “I was going to pick that alternative – I should have gone with my gut feeling” are common reactions in such cases. This is because people can easily imagine themselves selecting the correct alternative, especially if they actually had considered it before giving their final answer. For people who receive global or aggregated performance feedback (following multiple events), counterfactual alternatives should not be as readily available. People who receive global feedback should be more likely to use their feedback and their initial expectancies as their standards of comparison for constructing expectations about future performance on a similar task, as well as global estimates of confidence. If specific instances of feedback, as opposed to more global instances of feedback, lead one to counterfactualize reality and use a more optimistic standard of comparison, then receiving specific instances of feedback should lead to expectations of better global

performance, as well as estimates of greater confidence, than does a single instance of global feedback.

Overview of Experiment

In Experiment 2, participants were asked to complete a multiple-choice trivia test. Before participants began responding to trivia items, they reported their pre-test expectations. After completing each test item (or the entire test, depending on condition), participants were presented with either global or specific false feedback (when necessary to ensure 35% accuracy rate) regarding their performance. All participants were led to believe that they responded to 35% of the total trivia items correctly regardless of their actual performance. Half of the participants were also asked to complete a thought-listing task (after each item or after the completion of all trivia items, depending on condition). Participants were then asked to respond to questions regarding how well they would expect to perform on a future, similar trivia test, how confident they were that they would perform at the rate they expected, and how much they would bet that they would improve their performance.

Hypotheses

Five separate hypotheses were tested in Experiment 2:

Hypothesis 1: Participants assigned to the specific feedback condition were expected to generate a greater number of upward counterfactual thoughts in response to the feedback than were participants assigned to the global feedback condition. That is, a main effect of type of feedback on the number of upward counterfactuals generated was expected. As with Experiment 1, this hypothesis is consistent with Sherman et al.'s (1999) use of norm theory, which argued that specific events tend to increase one's

attention toward mutable features more than general events do. Participants were also expected to generate downward counterfactuals, as some favorable outcomes may have been perceived as nearly unfavorable. For instance, a participant may have had thoughts about two possible alternatives as the correct answer to an item, received favorable feedback, and experienced a form of relief after counterfactualizing the outcome as a “nearly unfavorable” one. However, upward counterfactual thoughts in response to nearly favorable outcomes tend to occur with greater frequency (Markman et al., 1993) than do downward counterfactual thoughts in response to nearly unfavorable outcomes, especially when the antecedents of the outcome are perceived to be controllable (Markman et al., 1995). Favorable outcomes may also be accepted at face value (Gilovich, 1983) and thus reduce the likelihood of downward counterfactual responses. Therefore, upward counterfactual responses were again expected to dominate among the counterfactual responses generated by participants.

Hypothesis 2: Participants assigned to the specific feedback condition were expected to report greater expectations of improving their performance on a similar trivia test, greater subjective confidence in doing so, and were expected to place greater bets than were participants assigned to the global feedback condition. In other words, a main effect of type of feedback on each of the three dependent variables was expected to emerge. This hypothesis was based on the assumption that Hypothesis 1 would be supported. If in fact specific feedback condition participants focused more on how they could have or should have correctly answered trivia items than did global feedback condition participants, they should have been correspondingly more likely to expect

better performance on a similar trivia test and feel greater subjective confidence in doing so.

Hypothesis 3: No main effect of thought-listing on any of the dependent variables was expected. Counterfactual responses (especially those by specific feedback condition participants) were expected to be generated by participants even when they are not deliberately asked to list their thoughts. The reasoning elaborated in the Hypothesis 5 section of Experiment 1 was employed here as well.

Hypothesis 4: The relative frequency of upward counterfactual responses to an event was expected to be a stronger predictor of post-test judgments than were pre-test expectations for specific feedback condition participants, but pre-test expectations were expected to be stronger predictors of post-test judgments than was upward counterfactual response frequency for global feedback condition participants. As described in Hypothesis 6 of Experiment 1, this hypothesis was based on the notion that the cognitive processing difference (stated in Hypothesis 1) resulted in different comparison cases for the two types of events.

Hypothesis 5: The relationships between the type of feedback (global or specific) and post-test judgments were expected to be statistically mediated by the relative frequency of upward counterfactual responses. If comparison cases for specific feedback were constructed through the mutation of specific feedback information and comparison cases for global feedback were constructed on the basis of pre-test expectations, counterfactuals should have mediated the relationships between the type of feedback and post-test judgments. Because it is hypothesized that a different factor (expectancies versus counterfactuals) should have operated depending on the type of feedback (global

versus specific), two separate interaction effects were also expected to emerge such that:

1) the relationships between pre-event expectations and the dependent variables were stronger for global feedback condition participants than for specific feedback condition participants; and 2) the relationships between counterfactual frequency and the dependent variables were stronger for specific feedback condition participants than for global feedback condition participants.

Method

Participants

A total of 132 undergraduate students, enrolled in psychology courses at Indiana University, participated in the experiment for partial fulfillment of course credit. Each experimental session included a maximum of four participants.

Materials

A goal of the current experiment was to control the level of performance feedback given to each participant. Thus, a set of 36 multiple-choice trivia items was designed such that each item's alternatives were perceived as feasibly correct. These types of items were expected to boost the perceived validity of any false feedback received by participants because each foil was a reasonable alternative. Twenty trivia items (see Appendix A) were then selected from the original set of 36 items on the basis of the results of a pilot test ($N = 33$). Those items that showed a relatively even distribution of alternatives selected as the correct answer and that reached a correct response rate between 15% and 60% were selected from the larger set. The remaining 20 items were then pilot tested to again determine the correct response rate for each item, as well as the overall performance rate for the 20 items ($N = 28$).² The correct response rate of all

items ranged between 10.7% and 71.4%. The average overall performance rate was 35.4% correct ($M = 7.07$, $SD = 2.91$).

Procedure

Upon arrival, participants were greeted by a laboratory assistant who gave them a brief oral introduction to the experiment and escorted them to a cubicle equipped with a personal computer. The experiment was introduced as a study of “what people think about as they respond to trivia questions.” All experimental materials were presented using MediaLab v2004 Research Software (Jarvis, 2004). The instructions of the experiment were self-paced, and participants advanced the instructions by pressing the space bar or a response key.

Participants were informed that they would be asked to respond to 20 trivia questions. To increase overall motivation and involvement in the task, participants were also informed that the names of the top ten high scorers, over the entire experiment, would be entered into a drawing for a \$30 prize. It was explained that the better they performed on the trivia test, the better their chances would be of winning the drawing.

Before participants began the trivia test, they were presented with sample items on a single screen for the purpose of informing them about the nature of the questions included in the trivia test. These items appeared again while participants were completing the test (items 8, 12, and 13)³. Importantly, participants were not be given the correct answers to these items, nor were they permitted to respond to them during the presentation of the test instructions. Participants were then asked how many items out of 20 they expected to answer correctly as well as how confident they were that they would

perform at this rate (i.e., response to the previous question) using a 7-point scale anchored at *not at all confident* (1) and *extremely confident* (7).

Participants were then presented with the multiple-choice trivia test consisting of the 20 items listed in Appendix A (in the order listed). Items were presented one at a time on a computer screen. Responses were made by clicking on one of three available choices (marked as A, B, and C). Participants were also randomly assigned to one of two performance feedback conditions (global or specific).

Global feedback condition. After completing the entire trivia test, participants assigned to the global feedback condition were informed that they correctly answered 7 out of the 20 items (35%). Thus, false feedback was given to participants who did not actually perform at this rate (i.e., the majority of the participants). These participants were reminded of the 20 trivia items (one per screen) with the answers they selected in parentheses (not the correct answers). Half of the participants were also asked to complete a thought-listing task (typing one thought per screen) for each of the 20 items. Specifically, these participants were asked to list thoughts that went through their mind during the trivia test, after answering trivia items, or after the global feedback they received. In order to assess whether or not the same expected effects occur even when people are not directly asked to list their thoughts, the other half of the global feedback participants were not asked to complete a thought-listing task. However, a delay with a countdown was displayed at the bottom of the screen as was described in Experiment 1.

Specific feedback condition. Participants in the specific feedback condition were also presented with performance feedback. However, they received feedback after responding to each trivia test item. This feedback informed participants whether or not

their response was correct or incorrect. The correct answer was revealed in cases for which they were informed that they were incorrect. Some of this feedback may have been false and was given such that participants were led to believe that they answered 7 of the 20 items correctly. That is, regardless of their responses, these participants were informed that their response was incorrect for 13 items and correct for 7 items. However, depending on their responses to the items, participants may have differed greatly in the sequence of feedback that they received. In other words, false feedback was given only when necessary such that each participant's performance conformed to 35% correct (7 out of 20).⁴

Immediately after receiving their feedback for each item, half of the participants were asked to complete a thought-listing task (typing one thought per screen). During this task, each of the trivia questions with the participant's response (and its "correct" response) was displayed on the screen. At the bottom of the screen, these participants were asked to list any thoughts that went through their mind while answering the trivia item or after the specific feedback they received. The other half of the participants were not asked to complete a thought-listing task (a countdown was displayed at the bottom of the screen).

Dependent variables. Following the listing of thoughts (or a delay depending on the condition), participants were asked to report how well they would expect to perform on a similar trivia test, consisting of 20 new items, by indicating how many items out of 20 they would expect to answer correctly using a 21-point scale (0/20, 1/20, 2/20,...20/20). Participants were also asked to indicate their subjective confidence in their ability to perform at this rate (i.e., response to previous question) on another trivia

test using a 7-point scale anchored at *not at all confident* (1) and *extremely confident* (7). Finally, participants were asked the following hypothetical question: “Hypothetically, if you had \$100, how much of it would you bet on the chance that you would correctly answer more than 7 items on a similar, 20-item trivia test?” Participants were then asked about any suspicions they may have had about the validity of the feedback they received; they were then debriefed and thanked for their participation. Following the data collection phase of the experiment, an electronic drawing was conducted and the winning participant was contacted to receive the award.

Design and Analyses

Experiment 2 employed a 2 (type of feedback: global vs. specific) \times 2 (thought-listing: yes vs. no) complete between-groups factorial design. Performance expectation, subjective confidence rating, and reported bet value were examined as dependent variables. Dependent variables, and the influences of the type of feedback, thought-listing instructions, pre-test expectancies, and counterfactuals, were examined using a combination of ANOVA statistics as well as correlational and hierarchical multiple regression analyses.

Importantly, all data were analyzed with respect to the actual percentage of items that participants answered correctly (rather than the 35% success rate they were given). The actual performance of participants was important to consider for a number of reasons. Those participants who actually responded to more items correctly may have possessed more knowledge of trivia or may perform better on trivia tests. Because people generally have a good sense of their trivia skills, either of these factors may have affected each participant’s pre-test expectancy. In addition, the further a participant’s

actual performance deviated from 35%, the more false feedback they received, and the greater their chances of detecting deception. Thus, beyond simply examining the correlation between pre-test expectancy and actual performance rate, actual performance rate was used as a covariate when appropriate.

Results

Preliminary Analyses

Importantly, participants in the two feedback conditions (global and specific) did not differ in their pre-test expectations. That is, regardless of feedback condition, participants held relatively equal expectations about their performance on the trivia test. Participants also did not differ in their actual performance on the trivia test nor their suspicion of the validity of the feedback they received (see the top half of Table 2.1). The total actual number correct for the entire sample was well within the range expected from the pilot study data ($M = 6.57$, $SD = 1.98$; 32.85% correct). Suspicion of the validity of the feedback was below the mid-point for both feedback conditions. Fortunately, yet surprisingly, actual performance did not correlate significantly with suspicion of the validity of the feedback, $r(130) = .15$, *ns*. Thus, the manipulation of false feedback appeared to be successful.

Intercoder Agreement of Thought- Listings

A total of 3,251 thoughts were listed by participants in the thought-listing condition. Each thought-listing response was coded by two separate coders as a counterfactual response (upward or downward) or a non-counterfactual response. Only one of the coders appeared to utilize the downward counterfactual as a category for coding thought-listing responses (total = 5). The overall agreement between the two

coders was 96.91%. The level of intercoder agreement nearly reached the levels recommended by Smith (2000); Spearman's $\rho = .80, p < .001$, Kappa = .79, $p < .001$ (the five downward counterfactuals were excluded from the Kappa test as it requires a symmetric table with matching values for each variable). The category agreement index for upward counterfactual responses was .87, whereas the category agreement index for non-counterfactual responses was .99.

A third coder was used to resolve the disagreements. A representative selection of counterfactual and non-counterfactual responses submitted by participants is displayed in Table 2.2.

Upward Counterfactuals

The average frequency of upward counterfactuals listed by participants in the thought-listing condition was 2.57. This total was out of 60 possible thoughts listed (a maximum of three thoughts could be listed for each item). Again, upward counterfactuals are more likely to emerge in response to undesirable events as opposed to desirable ones (Gilovich, 1983; Markman et al., 1993, 1995). Each item of the test, in and of itself, can be regarded as an event, and participants were told that they were correct 35% of the time. Thus, the frequency of upward counterfactuals listed by participants as a spontaneous response should be considered in this light.

As stated earlier, participants assigned to the specific feedback condition were expected to generate a greater number of upward counterfactual thoughts in response to the event than were participants assigned to the global feedback condition (Hypothesis 1). This hypothesis was supported by a main effect of feedback type on the frequency of upward counterfactuals listed by participants, such that specific feedback participants

listed almost four times the number of upward counterfactuals ($M = 4.06$, $SD = 2.04$) as did global feedback participants ($M = 1.09$, $SD = 1.51$), $F(1, 64) = 45.07$, $p < .001$.

As in Experiment 1, a Bayesian corrected proportion was also computed for upward counterfactual frequency. In the current experiment, the mean proportion of upward counterfactuals across the entire was .06; therefore, $b = 16$ (see p. 27).

According to this measure of upward counterfactual frequency, specific feedback participants listed a greater proportion of upward counterfactuals ($M = .08$, $SD = .03$) than did global feedback participants ($M = .04$, $SD = .03$), $F(1, 64) = 30.58$, $p < .001$.

Although all subsequent analyses examining upward counterfactual frequency as a moderator or mediator of other effects were computed using the Bayesian corrected proportion, the term “upward counterfactual frequency” is retained in the report of these analyses for ease of presentation.

Confidence Regarding a New Trivia Test

Three separate 2 (type of feedback) $\times 2$ (thought-listing condition) analyses of covariance (ANCOVA) tests were conducted for the three measures of confidence pertaining to a new, similar trivia test. Actual performance on the initial trivia test was included as a covariate in the test of differences between the feedback conditions among the dependent variables. However, this covariate was not statistically significant in any of the ANCOVAs. Thus, actual performance was not included in any of the subsequent analyses of Experiment 2. As stated in Hypothesis 2, participants assigned to the specific feedback condition were expected to report greater expectations of improving their performance on a similar trivia test, greater subjective confidence in doing so, and were expected to place greater bets than were participants assigned to the global feedback

condition. This hypothesis was supported for each of the dependent variables (see the bottom half of Table 2.1). There was no main effect of thought-listing condition and no interaction between feedback and thought-listing condition. Thus, the prediction that thought-listing instructions would not affect the dependent variables (Hypothesis 3) was supported.

Moderation of Pre-Test Expectations and Upward Counterfactuals

The final two hypotheses regarding moderation of pre-event expectations and moderation and mediation of post-event counterfactual responses were examined using hierarchical multiple regression analyses according to the procedures recommended by Cohen and Cohen (1983). In each of these analyses, the three confidence measures served as the dependent variables.

Pre-test expectancy and subjective confidence, as well as upward counterfactual frequency, were tested as moderators of the relationship between feedback type and the three confidence measures in nine separate hierarchical multiple regression models using the same procedures employed in Experiment 1 (global feedback = 0; specific feedback = 1; continuous variables were centered; simple slopes were plotted and examined at one standard deviation above and below the mean of continuous variables). For each hierarchical multiple regression model, feedback type and one of the proposed moderators were entered in step 1 and their interaction term was entered in step 2.

Of the nine tests of moderation, there was one marginal moderation effect and two others that were supported statistically; upward counterfactual frequency nearly moderated the relationship between feedback type and expected number correct on a new trivia test and significantly moderated the relationship between feedback type and

subjective confidence for a new trivia test, as well as the relationship between feedback type and hypothetical bet on a new trivia test. Feedback condition failed to reach significance in each of the three tests that included upward counterfactual frequency. These null effects of feedback type appear to be caused by the reduction of statistical significance by the contribution played by upward counterfactual frequency, as the effect of feedback type was observed when upward counterfactual frequency was not included in the model (see the tests of mediation for more detail on this issue).

Although there were no significant effects on expected number correct on a new trivia test (neither feedback type nor upward counterfactual frequency reached statistical main effects), the test of the interaction was marginal, ($\beta = -.38$, $t(62) = -1.62$, $p = .11$). As displayed in Figure 2.1, the expected pattern emerged; the relationship between the frequency of upward counterfactuals and expected number correct on a new trivia test appeared to be positive but only for specific feedback participants. Interestingly, the two points plotted in Figure 2.1 for specific feedback participants did differ significantly, ($\beta = .73$, $t(62) = 4.39$, $p < .001$).

Regarding subjective confidence for a new trivia test, a main effect for upward counterfactual frequency emerged, $\beta = .57$, $t(63) = 3.90$, $p < .001$; $R^2 = .22$, $F(2, 63) = 9.08$, $p < .001$. However, this main effect was qualified by an interaction between feedback type and upward counterfactual frequency, ($\beta = .42$, $t(62) = 2.04$, $p < .05$; $\Delta R^2 = .05$, $\Delta F(1, 62) = 4.17$, $p < .05$). As expected, simple slope analysis showed that subjective confidence for a new trivia test increased with upward counterfactual frequency but only for the specific feedback condition $\beta = .47$, $t(62) = 3.24$, $p < .01$ (see Figure 2.2). When counterfactual frequency was low, subjective confidence on a new

trivia test was associated with the global feedback condition, $\beta = -.42$, $t(62) = -2.27$, $p < .05$. No other simple slopes were statistically significant.

For the hypothetical bet on a new trivia test, no main effects were observed in the first step of the hierarchical multiple regression model. However, when upward counterfactual frequency was re-examined in the second step of the hierarchical multiple regression model, a main effect for upward counterfactual frequency did emerge, $\beta = .56$, $t(62) = 2.12$, $p < .05$. As was true for subjective confidence, an interaction between feedback type and upward counterfactual frequency qualified the main effect of upward counterfactual frequency, ($\beta = .46$, $t(62) = 1.98$, $p = .05$; $\Delta R^2 = .08$, $\Delta F(1, 62) = 3.93$, $p = .05$). As expected, simple slope analysis showed that the hypothetical bet for a new trivia test increased with upward counterfactual frequency but only for the specific feedback condition $\beta = .89$, $t(62) = 5.39$, $p < .001$ (see Figure 2.3). A marginal difference between global and specific feedback was also observed when counterfactual frequency was high, $\beta = .28$, $t(62) = 1.79$, $p < .08$. No other simple slopes were statistically significant.

In models that examined pre-test expectancy and subjective confidence as moderators, main effects were observed for feedback type in each of the three tests that included pre-test expectancy (average $\beta = .22$, $p < .05$), and in each of the three tests that included pre-test subjective confidence (average $\beta = .19$, $p < .05$).⁵ In addition, pre-test expectancy did emerge as a significant predictor of all three of the dependent variables (average $\beta = .30$, $p < .01$). Further, pre-test subjective confidence significantly predicted subjective confidence on a new trivia test and hypothetical bet for a new trivia test (average $\beta = .32$, $p < .01$). However, pre-test expectancy and pre-test subjective

confidence both failed to moderate the relationships between feedback type and the dependent variables.

Mediation of Upward Counterfactuals

Next, mediation analyses were examined with the current data according to the procedures outlined by Baron and Kenny (1986). In each of these analyses, the three measures of confidence regarding a new trivia test served as the dependent variables. As stated earlier, upward counterfactuals should mediate the relationships between feedback type and post-test judgments regarding performance on a new trivia test (Hypothesis 5).

First and foremost, there were three separate relationships for upward counterfactual frequency to possibly mediate: 1) the relationship between feedback type and expected number correct on a new trivia test, $\beta = .22$, $t(130) = 2.60$, $p < .05$; 2) the relationship between feedback type and subjective confidence for a new trivia test, $\beta = .24$, $t(130) = 2.78$, $p < .01$; and 3) the relationship between feedback type and hypothetical bet on a new trivia test, $\beta = .24$, $t(130) = 2.87$, $p < .01$.

Upward counterfactual frequency was tested as a mediator of the relationships between feedback type and the three dependent variables (see Figure 2.4). As indicated earlier in a one-way ANOVA, upward counterfactual frequency was significantly associated with the specific feedback condition, $\beta = .57$, $t(64) = 6.70$, $p < .001$. As displayed in Figure 2.4, when both feedback type and upward counterfactual frequency were entered into the regression model simultaneously, feedback type was no longer a significant predictor of any of the dependent variables. Yet, upward counterfactual frequency was a significant predictor of one of the three variables (i.e., subjective confidence for a new trivia test). Modified Sobel tests showed that the reduction in the

effect of feedback type on expected number correct on a new trivia test was not a significant reduction ($z = .67$, *ns*), nor was the reduction in the effect of feedback type on hypothetical bet on a new trivia test ($z = .68$, *ns*). However, the reduction in the effect of feedback type on subjective confidence for a new trivia test was significant ($z = 3.08$, $p < .001$).

Discussion

Several of the hypotheses tested in Experiment 2 were supported. As in Experiment 1, the results across the three measures of confidence for a new trivia test were not entirely consistent. However, expected number correct on a new test and hypothetical bet were the only confidence measures to correlate significantly, $r(130) = .45$, $p < .01$. Thus, with respect to the uniqueness of the measures themselves, and a plethora of previous research also showing inconsistencies between people's attitudes, expectations, and behavioral intentions, the inconsistencies in the current experiment are not too surprising.

Compared to Experiment 1, where pre-event expectancies appeared to play a moderating role and upward counterfactual frequency appeared to play a greater mediating role, both pre-test expectations and upward counterfactual frequency appeared to play a greater moderating role than a mediating one in the current experiment, although there was some evidence that upward counterfactual frequency played both roles. Again, this pattern of results suggests that counterfactual thoughts in reaction to an event are most relevant and influential to specific events, and that pre-event expectancies seem to be more clearly linked to reactions to general events.

The patterns of predicted values from the feedback type \times upward counterfactual frequency interactions are particularly interesting. Although the global feedback points plotted in Figure 2.3 were not significantly different from each other, and the difference between the two high upward counterfactual frequency points reached only marginal significance, the pattern is suggestive of a trend that can not be explained by upward counterfactual frequency alone. It is also important to remember that the points plotted in Figure 2.3 are predicted points estimated by the regression equation. An examination of the frequency of participants who actually listed a frequency of upward counterfactuals that was equal to or greater than one standard deviation above the mean showed that specific feedback participants outnumbered global feedback participants 10 to 1. In other words, the specific feedback/high upward frequency “cell” was well represented by one-fifth of the sample, whereas the global feedback/high upward counterfactual frequency cell was virtually empty. However, this particular regression equation still suggests that had the global event been counterfactualized as much as the specific event, a difference in the dependent variable may have been observed between the two types of events. This possibility presents an interesting question. People may not typically counterfactualize general events, but if they do, will their counterfactuals affect their judgments as they do for observers of specific events?

The patterns of moderation in the current data hint that the answer to such a question is no. One proposal for why this is might be the case involves the degree of validity that people attach to their thoughts (i.e., thought confidence; see Petty, Briñol, & Tormala, 2002). It is possible that people hold greater confidence in the counterfactuals they generate while thinking about and responding to specific events than they do for

general events. When one's confidence in their own simulated alternative is high, it seems likely that they will be more likely to perceive the likelihood of that alternative outcome to occur in the future and may be more willing to behave in a manner consistent with the alternative (e.g., bet on it). Such notions are consistent with related research showing that attitudes held with high, rather than low, certainty yield greater attitude-behavior correspondence (Fazio & Zanna, 1978; Rucker & Petty, 2004; Tormala & Petty, 2002). Thus, not only may it be easier to generate alternatives to specific events compared to general events, but one may also hold greater confidence in the validity or likelihood of simulated alternatives to reality generated in response to specific events as opposed to general events.

Furthermore, Roese and Maniar (1997) and Roese and Olson (1996) have demonstrated that counterfactual thinking is complementary to hindsight bias, (Fischhoff, 1975; Fischhoff & Beyth, 1975; Hawkins & Hastie, 1990), whereby people consistently overestimate what could have been anticipated in foresight. Thus, thinking that one should have gotten the right answer to a trivia question may lead one to believe that they actually did know the answer. Whether it is rooted in the hindsight bias or counterfactual thinking, the more certain one is that a particular outcome was predictable, the more confident they may feel that a change in an antecedent would have led to a change in the outcome (i.e., a sort of counterfactual thought confidence). Specific feedback participants would still be likely to feel greater confidence in this respect due to the nature of their feedback relative to that of the general feedback condition. Specific feedback participants were well aware of the items they "missed," thus they possessed information that may have helped them focus any counterfactual activity on particular

items. On the other hand, general feedback participants were not even sure of which items they missed. In their cases, any counterfactual thoughts would be less potent with regard to confidence because they lacked specific information that would support any claims as to what could have or should have been.

Another aspect of the results to consider involves the level of specificity of the counterfactuals that emerged for global and specific feedback participants. Counterfactuals in response to specific events are likely to be framed in specific ways, including the mutation of specific event features, whereas counterfactuals in response to general events are likely to be global and abstract in nature. Such a difference is compatible with the counterfactual thought confidence explanation. People who find that they are capable of supporting a claim should feel more confident about the claim's truth. Their sense of this capability is likely to be positively associated with the level of specificity of the information that they are using to support their claim in the first place. The perceived demonstrability of a counterfactual claim (e.g., "I could have performed better.") would seem to be positively correlated with counterfactual thought confidence (see Laughlin & Ellis, 1986). Thus, the role of counterfactual thought confidence in reaction to general versus specific cases warrants further investigation.

Another variable that did not appear to affect the dependent variables, but may still have an impact on judgments, is that of one's actual performance on the task. However, participants were unaware of their actual performance, and they were all led to believe that they responded to 35% of the items correctly. Yet, one's "true" performance (i.e., the level they were told that they performed) should serve as a salient reference point for expectations and judgments about similar, future events. This should be

especially true for global performance feedback individuals because they were less likely to entertain how they could have or should have performed better on the test. Because the current experiment involved false feedback that participants apparently believed, such notions could not be adequately tested here. This topic is more appropriately examined in Experiments 4 and 5.

Finally, the current results should also be considered in light of the results of the Sniezek and Buckley (1991) and Sniezek et al. (1990) experiments. In their experiments they measured how confident their participants felt at the time they responded to trivia questions, not after receiving feedback as in the current experiment. They showed that, when their participants who had completed a trivia test were asked about the probability of being correct for individual items, they tended to display classic overconfidence effects in their judgments. However, when their participants were asked to estimate their overall success rate across the entire set of items (an aggregate performance estimate), they failed to display overconfidence. In fact, on average, their participants appeared to be somewhat under-confident in estimates of their aggregate performance.⁶ In studies conducted by Sniezek and her colleagues, participants were not provided with performance feedback nor were they required to complete thought-listing tasks. Overconfidence for how correct one is before receiving feedback would seem to be at odds with the likelihood of imagining selecting an alternative answer for an item. Yet, a single trivia item seems to permit the generation of more thoughts about why one is correct than does a set of items. Thus, greater cognitive elaboration in response to specific items compared to global performance may drive the discrepancy found in confidence. With respect to the Sniezek et al. studies and the current experiment, it

seems that overconfidence for correctness on a specific item can either emerge before feedback is given or it can emerge for expectations regarding global performance on a new test, especially if people are given specific feedback item feedback. The tendency to be overconfident for current items and for future global performance on such items appears to be accounted for by the specificity of the judgment (i.e., confidence for global performance vs. confidence for a specific item) and the cognitive responses that follow the different levels of feedback specificity (i.e., global feedback vs. specific feedback) respectively. This latter notion was evidenced by its account of 41% of the variance in upward counterfactual frequency.

CHAPTER 4 – EXPERIMENT 3:

GENERAL AND SPECIFIC TENNIS MATCH EVENTS

Similar to Experiments 1 and 2, counterfactual thoughts were examined in Experiment 3 as a mediator of the relationship between the type of event and target-evaluation associations. However, the designs of the previous experiments were clearly likely to lead to upward counterfactuals responses (mentally simulated alternatives that improve on reality). It is uncertain whether or not downward counterfactuals (mentally simulated alternatives that worsen reality) also result from specific events more so than they do from general events and whether or not they have a similar effect on judgments. That is, like upward counterfactual responses to events, do downward counterfactuals also affect decisions and confidence regarding similar, future events? Unlike Experiments 1 and 2, Experiment 3 was designed such that both upward and downward counterfactual thinking would be expected to reduce confidence.

Overview of Experiment

In the current experiment, participants were presented with a general or specific report of the results of a simulated semi-final tennis match modified from Kahneman and Miller's (1986) and Markman et al.'s (1995) use of the "tennis match scenario." Participants were randomly assigned to one of two additional conditions, one that was likely to elicit upward counterfactuals (i.e., considering what may have gone through the mind of Tom, the loser of a close tennis match) or one that was likely to elicit downward counterfactuals (i.e., considering what may have gone through the mind of Jim, the winner of a close tennis match).⁷ Two-thirds of the entire sample of participants were asked to list thoughts in a thought-listing task in this regard, whereas the other third was

not asked to complete a thought listing-task. Participants then reported their reactions to the event by indicating how skilled they believed each player to be, whom they would be more likely to bet on if there was a rematch between the players, how likely they think Tom or Jim would be to win in a rematch, and how likely they think Jim is to win the championship match versus the other semi-final winner.

Hypotheses

Five separate hypotheses were tested in Experiment 3:

Hypothesis 1: Participants assigned to the specific event condition were expected to generate a greater number of upward and downward counterfactual thoughts (total counterfactuals) in response to the event than were participants assigned to the general event condition. That is, a main effect of type of event on the number of counterfactuals generated in response to the event (both upward and downward) was expected to emerge. Even participants who were exposed to general event information were expected to list counterfactuals in Experiment 3 because they were prompted to do so by the instructions of their thought-listing task. However, consistent with Sherman et al.'s (1999) arguments that specific events increase one's focus on mutable features, a greater number of upward and downward counterfactuals was expected for specific event condition participants.

Hypothesis 2: Participants assigned to list thoughts that may have gone through the mind of Tom (the loser of a close tennis match) were expected to generate a greater number of upward counterfactuals but a fewer number of downward counterfactuals than were participants assigned to list thoughts that may have gone through the mind of Jim (the winner of a close tennis match). In other words, an interaction between thought-listing instructions and type of counterfactual (upward versus downward – used as a

within-subjects variable) for the number of counterfactuals generated in response to the event was expected to emerge. This hypothesis is in accordance with the findings of Markman et al. (1995), which showed that people can easily generate both upward and downward counterfactuals to the same event by changing the locus of perceived focus. For participants who listed thoughts that might have gone through the mind of the loser, Tom, it should have been easier to generate upward as opposed to downward counterfactuals that entertained ways in which he might have won the match. On the other hand, for participants who listed thoughts that might have gone through the mind of the winner, Jim, it should have been easier to generate downward as opposed to upward counterfactuals that entertained ways in which he might have lost the match.

Hypothesis 3: Participants assigned to the general event condition were expected to report a more favorable evaluation of Jim (perceived as more skilled, more likely to bet on in a rematch, and perceived as more likely to win in a rematch) relative to Tom, than were participants assigned to the specific event condition. That is, main effects of event type on the post-event evaluations were expected to emerge. This hypothesis was based on the assumption that Hypothesis 1 would be supported. If specific event condition participants focused more on how either Jim might have lost or on how Tom might have won than general event condition participants, it is feasible to expect participants to be less likely to perceive the players as differing to a significant degree. In other words, the increased counterfactualizing by specific event condition participants was expected to reduce any differences that may have emerged in the perceived skill level and rematch promise of the players.

Hypothesis 4: A main effect of thought-listing instructions on each of the dependent variables was not expected to emerge from the data. As in Experiments 1 and 2, counterfactual thought responses were expected to be spontaneous in the current experiment. Participants who did not list thoughts were not encouraged to focus directly on how Jim almost lost, or how Tom almost won, the match. Thus, the counterfactual responses of the no-thought listing condition were not expected to be upward or downward exclusively. These participants were not expected to engage in counterfactual thinking to a lesser extent, but it seems likely that they would not feel as psychologically involved with the event as did participants in the other two thought-listing conditions. Having no identification with either player may have led to less confidence in the probability of any counterfactual simulation. However, the counterfactual thought responses of the no-thought-listing participants were expected to be as frequent as the other two thought-listing conditions (if not, more frequent because they were not bounded by the thought-listing instructions and were more likely to generate a mixture of both upward and downward counterfactuals). Therefore, no main effect of thought-listing instructions was expected to emerge for the dependent variables.

Hypothesis 5: The relationships between the type of event (general or specific) and post-event judgments were expected to be statistically mediated by the relative frequency of upward and downward counterfactual responses. If comparison cases for specific events were constructed through the mutation of specific event information, counterfactuals should have mediated the relationship between the type of event and post-event judgments.

Method

Participants

A total of 185 undergraduate students, enrolled in psychology courses at Indiana University, participated in the experiment for partial fulfillment of course credit. Only participants with knowledge of the basic rules of tennis were asked to participate in this experiment. Experimental sessions involved a maximum of six participants.

Procedure

Upon arrival, participants were greeted by a laboratory assistant who gave them a brief oral introduction to the experiment and escorted them to a cubicle equipped with a personal computer. The experiment was introduced as a study of “what people think about as they watch sports.” All experimental materials were presented using MediaLab v2004 Research Software (Jarvis, 2004). The instructions of the experiment were self-paced, and participants advanced the instructions by pressing the space bar or a response key.

Participants were presented with a general or specific report of the results of a simulated semi-final tennis match between two tennis players, Jim and Tom. Information for both types of events (general and specific) was presented by audio-visual display. All participants were informed that they would be presented with the scores, and some highlights, of a tennis match between Jim and Tom.

General event condition. Participants assigned to the general event condition viewed two highlight clips, randomly presented, with nothing abnormal occurring in either one (both beginning in mid-volley, with one ending in a point scored by a regular shot made by Jim and the other ending in a point scored by a regular shot made by Tom).

The highlight clips consisted of the tennis players volleying the ball for approximately 10-15 seconds (see Figure 3.1). Corresponding commentary conformed to the display of the highlight clips. General event condition participants were informed only of the scores of the four sets, two of which involved tie-breakers (similar to the design of Experiment 1). The score of the match was displayed on a scoreboard as 6-4, 3-6, 7-6 (7-4), 7-6(7-5) with Jim winning the match. During the display of the scoreboard it was explained to participants that Jim won the first set, Tom won the second set, and that Jim won the third and fourth sets, both ending in tie-breakers (via audio presentation).

Specific event condition. The same procedures employed for the general event condition were used for participants assigned to the specific event condition with two exceptions. First, six additional 10-15 seconds highlight clips were displayed. These highlight clips were well within what one might expect from a highlight sequence of a tennis match; that is, they included several features that varied in their perceived mutability (i.e., close shots and not so close shots). Specifically, these participants were presented with the following eight-highlight clip sequence: 1) a first set clip that began in mid-volley and ended with a failed shot made by Tom that came close to but missed the white line as it went out of play; 2) a second set clip that began in mid-volley and ended with a failed shot made by Jim that came close to but missed the white line and went out of play; 3) the same clip presented to general event condition participants that ended with Jim scoring the point (third set); 4) the same clip presented to general event condition participants that ended with Tom scoring the point (third set); 5) a third set tie-breaker clip that began with Tom serving the ball and ended with a shot made by Jim that hit the net but bounced over to Tom's side before it went out of play; 6) a fourth set clip that

began with Jim serving the ball and ended with Tom scoring the point on a return with a shot that came close to the line; 7) a fourth set tie-breaker clip that began with a serve by Jim and ended with a shot made by Jim that came close to the white line but stayed in before Tom was able to return the ball; and 8) a fourth set tie-breaker clip that began with a serve by Tom and ended with a shot made by Jim that came close to the line. Thus, there were events that could be mutated to change the outcome in Tom's or Jim's favor. Again, corresponding commentary conformed to the display of the highlight clips.

Thought-listing task. Following the highlights, scoreboard, and commentary, one third of the sample of participants was asked to imagine only what might have gone through the mind of Tom after the match and to list these thoughts in the form of a thought-listing task (one thought per screen). Another third of the sample of participants was asked to imagine only what might have gone through the mind of Jim after the match and to list these thoughts in the form of a thought-listing task (one thought per screen). The final third of the sample of the participants was not asked to complete a thought-listing task, nor were they asked to take the perspective of one of the tennis players.

Dependent variables. In the final task of the experiment, participants were asked to respond to four evaluative questions. Specifically, they were asked to indicate which tennis player they thought was more skilled by rating them on a 7-point scale anchored at *Tom is more skilled than Jim* (1) and *Jim is more skilled than Tom* (7), how likely they would be to bet on Tom or Jim if they were to play a rematch on a 7-point scale anchored at *I would definitely bet on Tom to win in a rematch* (1) and *I would definitely bet on Jim to win in a rematch* (7), and who they thought would be more likely to win in a rematch on a 7-point scale anchored at *Tom is most likely to win in a rematch* (1) and *Jim is most*

likely to win in a rematch (7). A final item was used to ask participants how likely they thought Jim was to win the championship match versus the other semi-final winner on a 7-point scale anchored at *not at all likely* (1) and *extremely likely* (7). Participants were then debriefed and thanked for their participation.

Design and Analyses

Experiment 3 employed a 2 (type of event frame: general vs. specific) \times 3 (thought-listing instructions: what went through the mind of Tom; what went through the mind of Jim; no thought-listing) between-groups factorial design. Dependent variables, and the influences of the type of event, thought-listing instructions, and counterfactuals, were examined using a combination of ANOVA statistics as well as correlational and hierarchical multiple regression analyses.

Results

Intercoder Agreement of Thought-Listings

A total of 880 thoughts were listed by participants in the thought-listing conditions. Each thought-listing response was coded by two separate coders as a counterfactual response (upward or downward) or a non-counterfactual response. The overall agreement between the two coders was 92.72%. The level of intercoder agreement failed to reach recommended levels; Spearman's $\rho = .65, p < .001$, Kappa = $.64, p < .001$. The category agreement index for non-counterfactual responses was $.96$, whereas the category agreement index was $.67$ for upward counterfactual responses and $.67$ for downward counterfactual responses.

Due to this suboptimal level of agreement between coders, a third coder was used to resolve the disagreements. A representative selection of counterfactual and non-counterfactual responses submitted by participants is displayed in Table 3.1.

Upward and Downward Counterfactuals

The average frequency of upward counterfactuals listed by participants in the thought-listing condition was .91, whereas the average frequency of downward counterfactuals was only .25. These totals were out of 10 possible thoughts listed.

As stated earlier, participants assigned to the specific event condition were expected to generate a greater number of counterfactual thoughts (in general) in response to the event than were participants assigned to the general event condition (Hypothesis 1). This hypothesis was supported by a marginal main effect of event type on the frequency of counterfactuals listed by participants, such that specific event condition participants listed a greater number of counterfactuals ($M = 1.35$, $SD = 1.36$) than did general event condition participants ($M = .96$, $SD = .92$), $F(1, 122) = 3.41$, $p = .06$.

A Bayesian corrected proportion was then computed and tested. In the current experiment, the mean proportion of total counterfactuals was .18; therefore, $b = 5.5$ (see p. 27). With this measure, Hypothesis 1 was supported statistically such that specific event condition participants listed a greater proportion of counterfactuals ($M = .20$, $SD = .12$) than did general event condition participants ($M = .15$, $SD = .08$), $F(1, 122) = 4.01$, $p < .05$.

Bayesian corrected proportions were also computed with respect to the type of counterfactual. In the current experiment, the mean proportion of upward counterfactuals was .14 and the mean proportion of downward counterfactuals was .04; therefore, $b_u = 7$

and $b_d = 25$ (see p. 27). Although all subsequent analyses examining upward and downward counterfactual frequency as moderators or mediators of other effects were computed using the Bayesian corrected proportion, the terms “upward counterfactual frequency” and “downward counterfactual frequency” were retained in the report of these analyses for ease of presentation.

In order to test whether or not the manipulation of counterfactual generation had operated in the directions intended, a 2 (type of event) $\times 2$ (thought-listing instructions) $\times 2$ (type of counterfactual) ANOVA was conducted with type of counterfactual used as a within-subjects factor (the no-thought-listing condition was not included in this analysis). See Figure 3.2 for a display of these results. From this analysis, a significant main effect of event type was again observed such that specific event participants listed a greater number of counterfactuals than did general event participants, $F(1, 120) = 4.01, p < .05$. A main effect of thought-listing instructions showed that participants who were asked to list thoughts that might have gone through the mind of Tom listed a greater number of counterfactuals than did participants who were asked to list thoughts that might have gone through the mind of Jim, $F(1, 120) = 18.83, p < .001$. As clearly shown in Figure 3.2, participants also listed more upward counterfactuals than they did downward counterfactuals, $F(1, 120) = 201.12, p < .001$.

These main effects were qualified by two two-way interactions. First, event type significantly interacted with thought-listing instructions, $F(1, 120) = 4.18, p < .05$. When participants were asked to list thoughts that might have gone through the mind of Jim, no difference in the frequency of counterfactuals listed was observed with regard to event type, $t(120) = .02, ns$. When participants were asked to list thoughts that might have

gone through the mind of Tom, specific event participants listed more counterfactuals than did general event participants, $t(120) = 2.93, p < .01$.

More important with regard to Hypothesis 2, the interaction between thought-listing instructions and type of counterfactuals was also significant, $F(1, 120) = 39.52, p < .001$. As expected, a comparison of the upward counterfactual frequencies across the Jim-thoughts versus Tom-thoughts conditions showed that participants who were asked to list thoughts that might have gone through the mind of Tom listed a greater frequency of upward counterfactuals than did participants who were asked to list thoughts that might have gone through the mind of Jim, $t(120) = 8.20, p < .001$. Although the means were in the direction expected, a comparison of the downward counterfactual frequencies across the Jim-thoughts versus Tom-thoughts conditions showed that participants in the two thought-listing conditions failed to differ in their frequency of listing downward counterfactuals, $t(120) = 1.34, ns$.

Surprisingly, the two-way interactions were qualified by the three-way interaction, $F(1, 120) = 6.94, p < .01$. As clearly shown in Figure 3.2, participants did not differ in their frequency of downward counterfactuals regardless of the conditions compared. When comparing upward counterfactual frequency by thought-listing condition, participants who were asked to list thoughts that might have gone through the mind of Tom listed a greater frequency than did participants who were asked to list thoughts that might have gone through the mind of Jim in both the general event ($t(120) = 3.09, p < .01$) and the specific event conditions ($t(120) = 7.88, p < .001$). Across participants who were asked to list thoughts that might have gone through the mind of Jim, participants in the two event conditions listed an equal number of upward

counterfactuals, $t(120) = .54$, *ns*. However, across participants who were asked to list thoughts that might have gone through the mind of Tom, participants in the specific event condition listed a greater number of upward counterfactuals than did participants in the general event condition, $t(120) = 4.28$, $p < .001$. Essentially, the three-way interaction (as well as the two-way interactions) appears to be driven largely by the upward counterfactuals generated by the specific event/Tom-thoughts condition participants. Finally, the main effect of type of counterfactual was observed in each of the four conditions such that upward counterfactual frequency was significantly greater than downward counterfactual frequency, average $t(120) = 7.29$, $p < .001$ (t -values ranged from 3.55, $p < .001$ to 12.75, $p < .001$).

Post-Event Evaluations and Judgments

As stated in Hypothesis 3, the increased counterfactualizing by specific event condition participants was expected to reduce any differences that may have emerged in the perceived skill level and rematch promise of the players. Thought-listing instructions were also expected to have an impact on the dependent measures, such that evaluations among no-thought-listing participants would favor Jim more so than either of the other two thought-listing conditions (Hypothesis 4). To examine Hypotheses 3 and 4, a separate 2 (type of event) \times 3 (thought-listing instructions) ANOVA was conducted for the four dependent measures. When appropriate (a main effect for thought-listing instructions), planned comparisons were computed to examine differences that may have emerged between the no-thought-listing condition and the other two thought-listing conditions (using the following coefficients: 1, -.5, -.5). For the purpose of interpreting

the results, it is important to remember that 4 was the mid-point on each of the dependent variable scales.

Regarding perceived skill, neither of the main effects nor the interaction was statistically significant. In other words, participants perceived the tennis skill of Jim and Tom to be equal regardless of event type or thought-listing instructions condition.

For evaluations pertaining to which player was more likely to win in a rematch, only a main effect for thought-listing instructions reached significance, $F(2, 179) = 4.00$, $p < .05$. This result showed that participants who were asked to list thoughts that might have gone through the mind of Tom did not perceive Jim to be any more likely to win in a rematch ($M = 4.56$, $SD = 1.79$) than did participants who were asked to list thoughts that might have gone through the mind of Jim ($M = 4.41$, $SD = 1.68$), $t(179) = .47$, *ns*. Yet, no-thought-listing participants did perceive Jim to be more likely to win in a rematch ($M = 5.25$, $SD = 1.74$) than did the other two thought-listing conditions, $t(179) = 2.81$, $p < .01$. It is feasible to conclude that this finding was due to either a reduced confidence in counterfactual thoughts among the no-thought-listing condition or a reduced tendency to counterfactualize the event in the first place (because they were not likely to feel that they identified with either player compared to the other two thought-listing conditions).

Regarding expectations about betting on one of the tennis players to win in a rematch, only a marginal main effect of thought-listing instructions was observed, $F(2, 179) = 2.13$, $p = .12$. Although the pattern of means was in the direction expected, the two thought-listing conditions (Tom-thoughts condition: $M = 4.39$, $SD = 1.65$; Jim-thoughts condition: $M = 4.73$, $SD = 1.66$) differed only marginally from that of the no-thought-listing condition, ($M = 5.02$, $SD = 1.67$), $t(179) = 1.77$, $p < .08$.

Interestingly, when participants considered how likely Jim was to win the championship match, an interaction between event type and thought-listing instructions was observed, $F(2, 179) = 4.16, p < .05$. Among participants who were assigned to the general event condition, the no-thought-listing condition ($M = 4.61, SD = 1.08$) did not differ from the other two thought-listing conditions (Tom-thoughts condition: $M = 4.93, SD = 1.31$; Jim-thoughts condition: $M = 4.91, SD = 1.03$), $t(179) = 1.14, ns$. However, among participants who were assigned to the specific event condition, the no-thought-listing condition reported a greater likelihood that Jim would win the championship ($M = 5.10, SD = 1.52$) than the other two thought-listing conditions (Tom-thoughts condition: $M = 4.19, SD = 1.25$; Jim-thoughts condition: $M = 4.45, SD = 1.15$), $t(179) = 2.84, p < .01$. The only other comparison that reached significance was that among participants who were asked to list thoughts that might have gone through the mind of Tom; general event participants reported a greater likelihood that Jim would win the championship than specific event participants, $t(179) = 2.35, p < .05$.

With respect to the pattern of results observed across all four of the dependent variables, greater support was observed for Hypothesis 4 than for Hypothesis 3. Explanations for the null results are considered in the Discussion section below.

Mediation of Upward and Downward Counterfactuals

The possibility that variance in counterfactual thinking, caused by event type and thought listing instructions, served as a mediating mechanism (Hypothesis 5) was examined using a series of correlational and hierarchical regression analyses. The correlational links between event type and counterfactual thinking, and between thought-listing instructions and counterfactual thinking, mirrored those reported earlier in the

ANOVA results. Because event type failed to affect any of the dependent variables, it was more appropriate to test the counterfactual frequencies as mediators of the relationships between thought-listing instructions and the dependent variables. In any case, all possible tests of mediation showed that neither upward nor downward counterfactual frequency significantly correlated with the dependent variables in models that controlled for either event type or thought-listing instructions.

Although all of the correlations between counterfactual frequencies and the dependent variables were not statistically significant, it came as no surprise that all of the correlations were negative. That is, there was a trend suggesting that the more participants had simulated alternatives to reality (either in an upward or downward fashion) the less likely they were to perceive Jim to have more skill and rematch promise than Tom. The correlations between the two counterfactual frequencies and the perceived likelihood of Jim winning the rematch were also negative, suggesting that the more one had engaged in counterfactual thinking the less likely they were to expect Jim to win the rematch. Explanations for these null results are also discussed below.

Discussion

Only a sub-set of the hypotheses of Experiment 3 were supported. As in earlier experiments, counterfactual thinking was again more frequently observed in response to a specific event than in response to a general event. However, event type appeared to be relevant only for how likely Jim was perceived to win the championship match versus the other semifinal match winner to the extent that it interacted with thought listing-instructions. All of the dependent variables, with the exception of perceived skill,

appeared to be more influenced by the thought-listing instructions than by the other variables.

Greater support was observed for Hypothesis 4 than for Hypothesis 3. These hypotheses were based on the idea that counterfactual thinking (upward or downward) would reduce any differences that may have emerged in the perceived skill level and rematch promise of the players. Specific event participants were expected to counterfactualize more than general event participants, both in an upward and a downward fashion (depending on thought-listing instructions). Either type of counterfactualizing would bring to mind how the outcome of Jim winning (or Tom losing) could have been easily reversed. Thus, differences were expected to be found in the general event condition but not in the specific event condition. This same reasoning was employed in arguments for a main effect of thought-listing instructions. Yet, only a difference in upward counterfactual thinking was observed (most frequently in the specific event/Tom-thoughts condition as expected). Still, participants in each of the conditions (even the general event conditions) engaged in a fair amount of upward counterfactual thinking, and certainly more than they engaged in downward counterfactual thinking. Surprisingly, upward counterfactual thinking was even more frequent than downward counterfactual thinking in the Jim-thoughts conditions (e.g., “Had I not made those mistakes, I wouldn’t have needed tie-breakers to win;” and “I should have won this earlier, but Tom kept the pressure on.”).

These tendencies are relevant to the null mediation results. Participants in the thought-listing conditions were essentially prompted to engage in counterfactual thinking in one direction or the other, both of which were expected to reduce perceptions of

superiority of Jim over Tom. Yet, the thought-listing instructions manipulation may have “worked” too well to the extent that it caused participants in the general event conditions to also engage in upward counterfactual thinking. With regard to Bayesian corrected proportions, participants in the current experiment engaged in more counterfactual thinking than did participants in either of the first two experiments. Further, a large majority of the thought-listing responses that were coded as counterfactuals tended to be some of the very first responses listed by participants. In fact, approximately 72% of all counterfactuals were listed within the first four thought-listing response screens (this tendency did not differ by event type or thought-listing condition). It is also possible that a single counterfactual response was as potent as two or three when it came to influencing one’s evaluations and judgments. Given that the majority of the participants who listed counterfactual responses did so rather early in the thought-listing task, counterfactual thought confidence was likely to be relatively high to the extent that accessibility signaled thought confidence (see Petrocelli, Tormala, & Rucker, 2007). If this was the case, variance in counterfactual frequency would do little for predicting variance in the dependent variables.

Although they were not provided with thought-listing instructions designed to promote a particular type of counterfactual thinking, the no-thought-listing condition participants may have also engaged in counterfactual thinking as they appeared to in earlier experiments. In fact, had they engaged in such cognitive activity, they were likely to generate a mixture of upward and downward counterfactual responses (most likely upward for Tom and most likely both upward and downward for Jim). Such possibilities may have further reduced the possibility of observing differences across the thought-

listing conditions. Future studies that examine the impact of both upward and downward counterfactual thinking on evaluations and judgments of general and specific events may improve upon the current paradigm by employing a task in which participants experience an event that creates a clearer divide between upward and downward simulations of reality while keeping the actor of the event constant. For instance, it would be important to determine whether or not people make different decisions and judgments for similar, future events depending on the direction of their counterfactual responses (i.e., upward vs. downward) and whether or not such a difference interacts with the type of event (i.e., general vs. specific).

CHAPTER 5 – EXPERIMENT 4:

GLOBAL AND SPECIFIC BLACKJACK PERFORMANCE FEEDBACK

Experiment 4 examined how people react to actual general and specific events, and how these reactions affect their decisions to bet on the outcomes of similar, future events. Because Experiment 4 deals with betting on the outcomes of events (i.e., blackjack), it relates very much to the work of Gilovich (1983) on gambling. Although Gilovich did not explicitly use counterfactual thoughts to explain his findings, the results of his experiments suggested that gamblers will continue to gamble, partially due to the upward counterfactuals that they generate following losses. Such effects are most likely to be found when a “freak” or abnormal occurrence takes place. However, the same type of effect (gambling despite losses) is expected to occur even in the normal observation of gambling events that do not involve highly abnormal or exceptional features. It is theorized that people show a greater tendency to counterfactualize a lost gamble when they are exposed to the specific features of the event than when exposed to the event’s general outcome, even when the event does not involve anything that is regarded as exceptional or highly abnormal.

This thinking is in line with Hofstadter’s (1979) intuitions about the pervasiveness of counterfactual thinking: “In everyday thought we are constantly manufacturing mental variants on situations we face, ideas we have, or events that happen, and we let some features stay exactly the same while others ‘slip’” (p. 641). Such notions are also in line with the arguments of other researchers regarding the conditions in which people tend to counterfactualize events. For instance, the results of studies conducted by Zeelenberg, van den Bos, van Dijk, and Pieters (2002) suggest that feelings of regret and

counterfactual responses can follow events characterized by normal causes (i.e., “inactions”) just as easily as can events that involve abnormal causes (i.e., actions), especially when prior and relevant outcomes are known. Thus, it appears that factors, beyond that of the perceived abnormality of a causal feature, may influence the pervasiveness of counterfactual thinking. It is proposed that the type of event (general or specific) may be one of these factors. On the basis of the arguments outlined by Sherman et al. (1999), it is proposed that people are more likely to counterfactualize their gambles when they are exposed to the specific features of a gamble than they are when they are exposed only to the general outcome of the very same gamble.

Overview of Experiment

Experiment 4 is somewhat similar to Experiment 2 to the extent that it involved participants reacting to real-time events that occurred while they were participating in the laboratory. However, Experiment 4 did not involve false feedback regarding the events they experienced. Rather, Experiment 4 was designed to examine a person’s judgments of their own confidence, after exposing them to global or specific event information about their own actual performance on a task. The current experiment also differs from the earlier experiments in that it involves gambling behavior under uncertainty. Similar to previous experiments that used money or points (e.g., Crowne & Liverant, 1963; Shipley, Powell, & Harley, 1970), confidence was operationalized as the number of tickets (for a chance to an electronic drawing) that participants were willing to place as bets.

In the current experiment, participants were asked to play 10 games of blackjack. It was explained to participants that their task was to win as many games of blackjack as

they could, and that they would have a chance to win a \$30 drawing in another part of the experiment. It was made clear to participants that their chances of winning the \$30 drawing depended on how well they performed in the experiment (i.e., how well they performed at playing blackjack). Before playing these games, participants reported their pre-event expectations. During the games, a global versus specific feedback manipulation was implemented. Half of the participants received global feedback information, whereas the other half received specific feedback information. Half of the participants also listed their thoughts while playing blackjack.

After the 10 games had been completed, participants were informed that they would play a final “bonus” game of blackjack. Before the bonus game was played, participants were given a small sheet of paper, reading “100 Tickets.” Participants were instructed to write their E-mail address on the paper. They were informed that their tickets would be entered into an electronic drawing for \$30 at the conclusion of the entire experiment. It was explained further that the more tickets they had to enter, the better their chances would be of winning the drawing. For a chance to increase their number of tickets, all participants were permitted to place a bet on winning the bonus game using any amount of their 100 tickets. They were informed that, if they placed a bet and won, the number of tickets that they bet would be added to their initial 100 tickets. This total would then be entered into the drawing. However, if they placed a bet and lost, the number of tickets that they bet would be subtracted from their initial 100 tickets. This total would then be entered into the drawing. Participants were instructed to report how likely they felt they were to win the bonus game, and to report their subjective confidence in winning the bonus game.

Hypotheses

Five separate hypotheses were tested in Experiment 4:

Hypothesis 1: Participants assigned to the specific feedback condition were expected to generate a greater number of upward counterfactual thoughts in response to the event than were participants assigned to the global feedback condition. That is, a main effect of type of feedback on the number of upward counterfactuals generated in response to the event was expected to emerge. As with Experiment 1, this hypothesis is consistent with Sherman et al.'s (1999) use of norm theory (see discussion of hypothesis 1 of Experiment 2).

Hypothesis 2: Participants assigned to the specific feedback condition were expected to report greater chances of winning the bonus game, report greater subjective confidence of winning the bonus game, and record a greater number of their tickets as bets on winning the bonus game than were participants assigned to the global feedback condition. In other words, a main effect of type of feedback on each of the three dependent variables was expected to emerge. This hypothesis was based on the assumption that Hypothesis 1 would be supported. If in fact specific feedback condition participants focused more on how they could have or should have won games of blackjack than did global feedback condition participants, they should have been correspondingly more likely to place greater bets, and feel greater subjective confidence in winning the bonus game.

Hypothesis 3: No main effect of thought-listing on any of the dependent variables was expected to emerge from the data. Counterfactual responses (especially those by specific feedback condition participants) were expected to be salient for participants even

when they were not deliberately asked to list their thoughts. The reasoning elaborated in the Hypothesis 5 section of Experiment 1 was employed here as well.

Hypothesis 4: The relative frequency of upward counterfactual responses to an event was expected to be a stronger predictor of post-event judgments than were pre-event expectations for specific feedback condition participants, but pre-event expectations were expected to be stronger predictors of post-event judgments than was upward counterfactual response frequency for global feedback condition participants.

As described in Hypothesis 6 of Experiment 1, this hypothesis was based on the notion that the cognitive processing difference (stated in Hypothesis 1) resulted in different comparison cases for the two types of events.

Hypothesis 5: The relationships between the type of feedback (global or specific) and post-event judgments were expected to be statistically mediated by the relative frequency of upward counterfactual responses. If comparison cases for specific feedback participants were constructed through the mutation of specific feedback information and comparison cases for global feedback participants were constructed on the basis of pre-event expectations, counterfactuals should have mediated the relationships between the type of feedback and post-event judgments. Because it was hypothesized that a different factor (expectancies versus counterfactuals) should have operated depending on the type of event (general versus specific), two separate interaction effects were also expected to emerge such that: 1) the relationships between pre-event expectations and the dependent variables were stronger for general event condition participants than for specific event condition participants; and 2) the relationships between counterfactual frequency and the

dependent variables were stronger for specific event condition participants than for general event condition participants.

Method

Participants

A total of 120 undergraduate students, enrolled in psychology courses at Indiana University, participated in Experiment 4 for partial fulfillment of course credit. Each experimental session involved a single participant. Only participants with basic knowledge of how blackjack is played were recruited to participate in the experiment. However, a total of 20 participants expressed at some point during the session that they were not entirely familiar with the game of blackjack, and additional instructions were provided to ensure that they understood the rules and objectives of the game. The data of these participants were excluded from all analyses, resulting in 100 participants for the final sample.

Procedure

Upon arrival, participants were greeted by a laboratory assistant who gave them a brief oral introduction to the experiment. Similar to the cover story employed by Markman et al.'s (1993) study, the experiment was introduced as a study of "what people think about as they gamble."

Participants were then asked to play 10 games of standard blackjack (without splits or double downs). To ensure that participants understood the basic rules of the game, a brief introduction was provided with examples. It was also highlighted that most gambling games involve luck, but that blackjack is one of the few gambling games that involves some luck but just as much skill and decision making.

For each hand of blackjack, participants were informed that they would play only against the dealer (the experimental assistant) and that they were to get as close to 21 as they could without “busting.” It was explained to participants that ties between the dealer and a participant were counted as a win for the dealer, because the dealer was required to hit when dealt 16 or less.

To increase overall motivation and involvement in the task, it was explained to participants that their task was to win as many games of blackjack as they could, and that they would have a chance to win an electronic \$30 drawing in another part of the experiment. It was made clear to participants that their chances of winning the \$30 drawing depended on how well they performed in playing blackjack.

Before the first game was dealt, participants were asked to indicate on a piece of paper the number of games out of 10 that they expected to win. In addition, participants were asked to rate how confident they felt that they would win at least the number of games they predicted they would win on a 7-point scale anchored at *not at all confident* (1) and *extremely confident* (7).

Participants sat at a table directly across from the dealer (the laboratory assistant). For each game of blackjack, the dealer first shuffled the cards and dealt two cards (one face-down and one face-up) to the participant and himself. The dealer then gave another face-up card to the participant each time the participant “hit.” No additional cards were given to the participant when the participant “stayed.”

Global feedback condition. For participants assigned to the global feedback condition, a slightly modified version of blackjack was employed for the 10 games. At the conclusion of each game (when the dealer stayed or busted), all participants were

instructed to turn over their face-down card. However, for each game the dealer did not turn over his face-down card. In addition, any additional cards dealt to the dealer were dealt face-down and at no time revealed to participants. These participants were only informed of whether or not they won the game. Thus, the dealer recorded the winner of each game and recorded the number of games won by each participant on a sheet of paper. Directly following each instance of feedback, half of the participants were instructed to list on a sheet of paper any thoughts that went through their minds during the game or after learning about the outcome. The other half of these participants were not asked to list their thoughts.

Specific feedback condition. The procedures used for participants assigned to the specific feedback condition were the same as the procedures used for the participants assigned to the global feedback condition with one exception. When the player decided to stop taking cards during a game, the dealer turned over his face-down card and continued to take cards when required (at or below 16). The dealer did not turn over his face-down card in games whereby the player busted (went beyond 21). Similar to the procedures used for the global feedback condition participants, half of the specific feedback condition participants were asked to list any thoughts that went through their minds during each game or after discovering the results of the game. The other half of these participants were not asked to list their thoughts.

Bonus game and dependent variables. Following the feedback manipulation, participants were reminded about the possibility of winning an electronic drawing for a \$30 prize. Before the bonus game was played, participants were given a small sheet of paper, reading “100 Tickets;” and it was implied that their number of tickets was based

on how well they performed in the 10 games (i.e., “You performed within the 100 tickets range.”). It was explained to participants that their participant number would be attached to their E-mail address for the purpose of the electronic drawing. They were then informed that their tickets would be entered into an electronic drawing for \$30 at the conclusion of the entire experiment. It was explained further that the more tickets they had to enter, the better their chances would be of winning the drawing. For a chance to increase their number of tickets, all participants were permitted to place a bet on winning the bonus game (any amount between 10% and 100% of their available tickets). All participants, regardless of the number of games they won, were informed that they had attained 100 tickets to enter into the electronic drawing. They were then informed that, if they placed a bet and won, the number of tickets that they bet would be added to their initial 100 tickets. This total would then be entered into the drawing. However, if they placed a bet and lost, the number of tickets that they bet would be subtracted from their initial 100 tickets. This total would then be entered into the drawing. Participants in both event conditions were informed that they would see all of the dealer’s cards for the bonus game, as they would in a standard version of blackjack. Participants were then instructed to record their bet on the piece of paper given to them by the laboratory assistant. The nature of blackjack (i.e., it involves skill and luck) was stated again, just before participants placed their bets. Participants were also asked to indicate their perceived chances of winning the bonus game on a 7-point scale anchored at *not at all likely* (1) and *extremely likely* (7), and their subjective confidence in winning the bonus game on a 7-point scale anchored at *not at all confident* (1) and *extremely confident* (7). Following the conclusion of the bonus game, participants were debriefed and thanked for their

participation. Following the data collection phase of the experiment, an electronic drawing was conducted and the winning participant was contacted to receive the award.

Design and Analyses

Experiment 4 employed a 2 (type of event feedback: global vs. specific) \times 2 (thought-listing: yes vs. no) complete between-groups factorial design. The perceived chances of winning the bonus game, subjective confidence rating, and total bets (percentage of total points available) were examined as dependent variables. Dependent variables, and the influences of the type of event, thought-listing instructions, pre-event expectancies, and counterfactuals, were examined using a combination of ANOVA statistics as well as correlational and hierarchical multiple regression analyses. The number of games won by the participant was also included as a covariate in some of these analyses. Mediation analyses were examined according to the procedures outlined by Baron and Kenny (1986).

Results

Preliminary Analyses

Importantly, participants in the two feedback conditions (global and specific) did not differ in their pre-event expectations (i.e., the number of games they expected to win and their subjective confidence in winning at least that number). That is, regardless of feedback condition, participants held relatively equal expectations about the number of games they expected to win as well as how subjectively confident they were at winning the number of games they expected to win. Participants also did not differ in the number of games they actually won (see the top half of Table 4.1).

Intercoder Agreement of Thought-Listings

A total of 500 thoughts were listed by participants in the thought-listing condition. Each thought-listing response was coded by two separate coders as a counterfactual response (upward or downward) or a non-counterfactual response. The overall agreement between the two coders was 94.00%. The level of intercoder agreement nearly reached the levels recommended by Smith (2000); Spearman's $\rho = .82, p < .001$, Kappa = $.82, p < .001$. The category agreement indexes were .96 for non-counterfactual responses, .87 for upward counterfactual responses, and .71 for downward counterfactual responses.

A third coder was used to resolve the disagreements. A representative selection of counterfactual and non-counterfactual responses submitted by participants in the thought-listing conditions is displayed in Table 4.2.

Upward and Downward Counterfactuals

The average frequency of upward counterfactuals listed by participants in the thought-listing condition was 2.10, whereas the average number of downward counterfactuals was .20. These totals were out of 10 possible thoughts listed. In gambling, upward counterfactuals are more likely to emerge in response to losses as opposed to wins, and wins are often taken at face value (Gilovich, 1983). Each game of blackjack, in and of itself, can be regarded as an event. On average, participants won approximately 40% of their games. Thus, the frequency of counterfactuals listed by participants as a spontaneous response should be considered in this light.

As stated earlier, participants assigned to the specific feedback condition were expected to generate a greater number of upward counterfactual thoughts in response to

the event than were participants assigned to the global feedback condition (Hypothesis 1). This hypothesis was supported by a main effect of feedback type on the frequency of upward counterfactuals listed by participants, such that specific feedback participants listed more than twice the number of upward counterfactuals ($M = 2.92$, $SD = 1.18$) as did global feedback participants ($M = 1.28$, $SD = .84$), $F(1, 48) = 31.72$, $p < .001$. The feedback conditions did not differ in their frequency of downward counterfactuals, $F(1, 48) = .39$, *ns*.

In addition to the influence of type of event, one possible mechanism that may increase the tendency to engage in counterfactual thinking may be a general motivation to explain disconfirmed expectancies (Kahneman & Miller, 1986). In fact, Wong and Weiner (1981) showed that people tend to be more motivated to explain unexpected outcomes than they are expected ones. As suggested by Olson et al. (1996), perhaps the greater the discrepancy between expectancies and the outcome, the greater there is a tendency to counterfactualize features of an event. Any such tendency would be expected to be especially great for specific events in which observers have readily accessible event features to mutate.

These notions were tested by creating a variable that represented the discrepancy between expected number of blackjack game wins and the actual number of games of blackjack won (actual - expected). As expected, this discrepancy variable had a significant relationship with upward counterfactual frequency ($r(48) = -.28$, $p < .05$), such that upward counterfactual frequency increased as the discrepancy between the actual games won and expected number of wins grew larger in the negative direction (i.e., fewer wins than expected). However, when the data were split with respect to feedback type

(global vs. specific) a Fisher's z -transformation comparison of independent correlations failed to show a difference between the two correlations, $z = -.45$, *ns*. In addition, the magnitude of the discrepancy variable, itself, did not vary by feedback condition, $F(1, 98) = .08$, *ns*. Thus, neither the relationship between disconfirmed expectations and upward counterfactual frequency nor the degree of disconfirmed expectations was influenced by the type of feedback provided. Rather, upward counterfactual frequency appears to have been caused by the nature of the feedback given to participants and was associated with the degree to which participants experienced failed expectations. It is also worth noting that expected number of wins correlated negatively with the discrepancy variable, $r(48) = -.57$, $p < .001$, and positively with upward counterfactual frequency, $r(48) = .35$, $p < .05$. These results suggest, of course, that high expectations alone can lead a greater likelihood of experiencing disconfirmed expectations and subsequently more frequent counterfactual responses to the event.

A Bayesian corrected proportion was not computed for the current experiment. This is because all of the participants assigned to the thought-listing conditions managed to complete one thought after each game of blackjack. Thus, the total number of thoughts listed did not vary from 10. Any transformation using total number of thoughts and upward counterfactual frequency would have resulted in identical conclusions.

Confidence Regarding the Bonus Game

Three separate 2 (type of feedback) \times 2 (thought-listing condition) ANCOVA tests were conducted for the three measures of confidence pertaining to the bonus game (the three dependent variables correlated significantly with one another, average $r(98) = .44$, $p < .01$). Number of games of blackjack won was included as the covariate in the

test of differences between the feedback conditions among the dependent variables. This covariate reached statistical significance for perceived likelihood of winning the bonus game, $F(1, 97) = 11.87, p < .01$ ($r = .36, p < .01$), and for subjective confidence in winning the bonus game, $F(1, 97) = 9.79, p < .01$ ($r = .30, p < .01$), but not for tickets bet on winning the bonus game, $F(1, 97) = .26, ns$ ($r = .07, ns$).

As stated in Hypothesis 2, participants assigned to the specific feedback condition were expected to report greater chances of winning the bonus game, report greater subjective confidence of winning the bonus game, and record a greater number of their tickets as bets on winning the bonus game than were participants assigned to the global feedback condition. This hypothesis was supported for each of the dependent variables (see the bottom half of Table 4.1). There was no main effect of thought-listing condition and no interaction between feedback and thought-listing condition. Thus, the prediction that thought-listing instructions would not affect the dependent variables (Hypothesis 3) was supported.

Moderation of Pre-Event Expectations and Upward Counterfactuals

The final two hypotheses regarding moderation of pre-event expectations and moderation and mediation of post-event counterfactual responses were examined using hierarchical multiple regression analyses according to the procedures recommended by Cohen and Cohen (1983). In each of these analyses, the three confidence measures served as the dependent variables.

Pre-event expectancy and subjective confidence, as well as upward counterfactual frequency, were tested as moderators of the relationships between feedback type and the three post-event measures in nine separate hierarchical multiple regression models using

the same procedures employed in Experiments 1 and 2 (global feedback = 0; specific feedback = 1; continuous variables were centered; simple slopes were plotted and examined at one standard deviation above and below the mean of continuous variables). For each hierarchical multiple regression model computed, step 1 was employed to statistically control for number of games of blackjack won and the expectancy variables. Feedback type and one of the proposed moderators were entered in step 2 and their interaction term was entered in step 3.

Nine tests of moderation were examined. Each of the six models that examined pre-event expectancy and subjective confidence as moderators failed to reveal significant interaction effects. However, there were two tests of moderation that were supported statistically; upward counterfactual frequency moderated the relationship between feedback type and perceived likelihood of winning the bonus game as well as the relationship between feedback type and subjective confidence in winning the bonus game. Feedback condition failed to reach a significant main effect in each of the nine tests. These null effects of feedback type appeared to be caused by the reduction of significance by the contribution played by upward counterfactual frequency, as the effect of feedback type was observed when upward counterfactual frequency was not included in the model (see the tests of mediation for more detail on this issue).

Regarding perceived likelihood of winning the bonus game, main effects of pre-event expectancy, ($\beta = .37, t(46) = 2.79, p < .01$) and of pre-event confidence ($\beta = .27, t(46) = 2.02, p = .05$) emerged in the first step of the analysis, $R^2 = .22, F(3, 46) = 4.43, p < .01$. No other main effects were observed. However, the main effects were qualified by an interaction between feedback type and upward counterfactual frequency in the third

step, ($\beta = .54$, $t(43) = 2.18$, $p < .05$; $\Delta R^2 = .08$, $\Delta F(1, 43) = 4.77$, $p < .05$). As expected, simple slope analysis showed that perceived likelihood of winning the bonus game increased with upward counterfactual frequency but only for the specific feedback condition $\beta = .71$, $t(43) = 3.99$, $p < .001$ (see Figure 4.1). No other simple slopes were statistically significant.

For subjective confidence in winning the bonus game, only a main effect of pre-event expectancy, ($\beta = .43$, $t(46) = 2.79$, $p < .01$) was observed in the first step of the analysis, $R^2 = .24$, $F(3, 46) = 4.77$, $p < .01$. As was true for perceived likelihood of winning the bonus game, an interaction between feedback type and upward counterfactual frequency qualified the main effect, ($\beta = .66$, $t(43) = 2.76$, $p < .01$; $\Delta R^2 = .12$, $\Delta F(1, 43) = 7.66$, $p < .01$). As expected, simple slope analysis showed that subjective confidence in winning the bonus game increased with upward counterfactual frequency but only for the specific feedback condition $\beta = .88$, $t(43) = 5.22$, $p < .001$ (see Figure 4.2). When upward counterfactual frequency was high, confidence in winning the bonus game was marginally greater for specific feedback participants than it was for global feedback participants, $\beta = .49$, $t(43) = 1.85$, $p < .08$. No other simple slopes were statistically significant.

Two additional variables were considered as a moderator of the relationships between feedback type and the dependent variables. As discussed earlier in the ANCOVA results, the dependent variables generally increased with the number of games of blackjack won. This information (the number of games they had just won out of ten) was readily available to all of the participants. Further, direct experience (i.e., newly encountered information) plays a primary role in expectancies and expectancy revision.

Olson et al. (1996) argued on the basis of their model of expectancy process that disconfirmation of expectancies is directly linked to expectancy revision under conditions of systematic and effortful processing. In this light, it was reasoned that pre-event expectancies may have moderated the relationship between feedback type and the dependent variables because expectations regarding future judgments were partly revised by the experience of the task itself (i.e., the outcomes of playing 10 games of blackjack). This should be especially true in the global feedback condition where counterfactualizing appeared to be less likely to occur in response to the event compared to that of the specific feedback condition, and a greater amount of one's available cognitive resources could be devoted to self-evaluation with respect to the task at hand. If expectations are "revised" when highly relevant and salient information is made readily available, one should expect to find confidence in winning future games of blackjack to be positively correlated with previous win percentage.

To test this possibility, the number of games of blackjack won was tested as a moderator of the relationship between feedback type and the dependent variables. In these tests, only a marginal interaction between feedback type and the number of games won was found for the number of tickets bet on winning the bonus game, $\beta = -.24$, $t(96) = -1.70$, $p < .10$, $R^2 = .08$, $F(3, 96) = 2.81$, $p < .05$. The predicted points of the regression equation are displayed in Figure 4.3. Although the results appear to trend in the direction expected, the two points plotted for the global feedback condition reached only marginal significance, $\beta = .38$, $t(96) = 1.75$, $p < .09$. Because the two points plotted for the specific feedback condition did not differ, the results suggest that, even when specific feedback condition participants did not win very many games of blackjack, they felt as

confident as did participants who did win a lot by betting a substantial number of tickets on winning the bonus game. However, the difference in the number of tickets bet on winning the bonus game between global and specific feedback condition participants who won a relatively low number of games ($\beta = .39$, $t(96) = 2.81$, $p < .01$) may reflect greater confidence in simulated alternatives considered among specific feedback condition participants (no other simple slopes were statistically significant). Thus, it is important to determine whether or not the confidence that a person holds in any could have, would have, or should have statements that they generate, in addition to counterfactual frequency, also impacts judgments of recently experienced events and similar, future events (see Experiment 5). That is, the notion that people vary in the conviction to which they believe something different could have actually occurred, as a result of exposure to general versus specific event information, should be studied further.

Finally, with regard to moderation, it was reasoned that, for specific feedback participants, an upward counterfactual in response to a lost game of blackjack could function perceptually as a win (i.e., a proxy for a win), when evaluating one's skill at playing blackjack. This may be especially true if the outcome is perceived as a near win. Thus, the sum of the number of games of blackjack won plus the number upward counterfactual responses (made after losing games) was tested as a potential moderator. It was expected that the dependent variables would increase with this summed variable, but especially for specific feedback participants. In fact, evidence for moderation by the sum of games won and upward counterfactuals following losing games was found for perceived likelihood of winning the bonus game; that is, an interaction between feedback type and the summed variable was supported statistically, $\beta = .57$, $t(46) = 2.14$, $p < .05$,

$R^2 = .20$, $F(3, 46) = 3.70$, $p < .02$. The predicted points of the regression equation are displayed in Figure 4.4. As predicted, perceived likelihood of winning the bonus game increased significantly with the sum of the number of games of blackjack won and upward counterfactuals, but only for the specific feedback condition, $\beta = .53$, $t(46) = 3.38$, $p < .01$. In addition, when the summed variable was high, specific feedback participants tended to report a greater perceived likelihood of winning the bonus game than did global feedback participants, $\beta = .38$, $t(46) = 2.01$, $p < .05$. No other simple slopes were statistically significant.

Mediation of Upward Counterfactuals

Next, mediation analyses were examined with the current data according to the procedures outlined by Baron and Kenny (1986). In each of these analyses, the three measures of confidence regarding the bonus game served as the dependent variables and the number of games of blackjack won was controlled for in an initial step. As stated earlier, upward counterfactuals should mediate the relationships between feedback type and post-event judgments regarding the bonus game (Hypothesis 5).

First and foremost, there were three separate relationships for upward counterfactual frequency to possibly mediate: 1) the relationship between feedback type and perceived likelihood of winning the bonus game, $\beta = .22$, $t(98) = 2.20$, $p < .05$; 2) the relationship between feedback type and subjective confidence in winning the bonus game, $\beta = .21$, $t(98) = 2.12$, $p < .05$; and 3) the relationship between feedback type and tickets bet on winning the bonus game, $\beta = .23$, $t(98) = 2.28$, $p < .05$.

Upward counterfactual frequency was tested as a mediator of the relationships between feedback type and the three dependent variables (see Figure 4.5). As indicated

earlier in a one-way ANOVA, upward counterfactual frequency was significantly associated with the specific feedback condition, $\beta = .63$, $t(48) = 5.63$, $p < .001$. As displayed in Figure 4.5, when both feedback type and upward counterfactual frequency were entered into the regression model simultaneously, feedback type was no longer a significant predictor of any of the three dependent variables. Yet, upward counterfactual frequency was a significant predictor of one of the three variables (i.e., tickets bet on winning the bonus game). Modified Sobel tests showed that the reductions in the effect of feedback type on perceived likelihood of winning the bonus game ($z = .46$, *ns*) and subjective confidence in winning the bonus game were not significant reductions ($z = .78$, *ns*). However, the reduction in the effect of feedback type on tickets bet on winning the bonus game was significant, $z = 2.25$, $p < .05$. Thus, evidence of mediation via upward counterfactual frequency was strongest for the relationship between feedback type and tickets bet on winning the bonus game. The same result was found when controlling statistically for the number of games of blackjack won.

Discussion

Several of the hypotheses of Experiment 4 were supported. Upward counterfactual thoughts emerged more frequently in response to specific event feedback than in response to global event feedback. Again, correlational analyses showed that upward counterfactual frequency appeared to be more relevant to judgments following specific feedback. The null effects of pre-event expectancies and subjective confidence may have been overshadowed by newly revised expectancies, especially those of global feedback participants. Some support for this was found by the trend of data revealed in the test of number of games of blackjack won as a moderator of the relationship between

feedback type and tickets bet on winning the bonus game. Thus, the central notion of the current dual-process conceptualization of reactions to general and specific events, that observation of general versus specific events lead to the formation of different standards of comparison, was partially supported. However, it appears that pre-event expectations can be revised by the incorporation of recently obtained information. Therefore, the pre-event expectations measured in the current experiment were not likely to serve as potent predictors of expectations for similar, future events.

On the other hand, upward counterfactual frequency either moderated the relationships between feedback type and the dependent variables (i.e., perceived likelihood of winning the bonus game and subjective confidence in winning the bonus game), or it mediated the relationships between feedback type and the dependent variables (i.e., tickets bet on winning the bonus game). Although not originally predicted, there was some evidence for the notion that counterfactuals following losses could be treated perceptually as wins, especially for the condition that was expected to lead to the most counterfactual responses (i.e., the specific feedback condition). This was evidenced by the interaction between feedback type and the sum of wins and upward counterfactual frequency for the perceived likelihood of winning the bonus game, whereby the sum of wins and counterfactuals expressed by specific feedback condition participants was positively related to this perception.

The moderation of the summed variable is consistent with Miller and Turnbull's (1990) notion of the counterfactual fallacy, whereby people confuse what might have been with what should have been. However, it would be interesting to determine in subsequent studies whether or not perceivers go a step further, that is, rather than simply

confuse what might have been with what should have been, do perceivers sometimes confuse what might have been with what was? With respect to earlier research on the accuracy of one's memory, the answer appears to be yes.

In studies on the "illusion of control," Langer and Roth (1975) showed that, when people thought there was some skill involved in guessing the outcomes of coin tosses, they overestimated how many they guessed correctly following 30 trials (also see Langer, 1975). Likewise, participants in the current experiment were reminded twice that blackjack is a game that involves some skill. Further, Garry and Polaschek (2000) have argued that people can misremember a counterfactualized outcome as a truth, as a function of source confusion or familiarity. These researchers also argued that a source monitoring problem would be more likely to occur when a time delay is introduced between the event and the moment of recall; that is, the source confusion would be more likely to emerge if the recall isn't requested directly after the event itself. It is uncertain how many wins participants thought they had before they were reminded of this total following the 10th and final game (just before being informed about the bonus game). However, it seems likely that, if either feedback condition was to overestimate their total number of wins, it would have been the specific feedback condition because of their increased tendency to counterfactualize losses. Future examinations of such questions may do well by first determining whether or not upward counterfactual frequency is positively correlated with the frequency of misremembered desirable events.

Perhaps most important, and in contrast to Experiments 1, 2, and 3, the current experiment dealt with actual events that participants experienced themselves (without any false feedback). The current experiment did not employ false feedback, nor did it involve

abnormal events. The results provide further evidence that people may mentally simulate alternatives to reality even when nothing out of the ordinary occurs. Thus, the current conceptualization of a dual-process model of reactions to general and specific events may apply to personally-experienced, “normal” events as well as passively-observed, unusual events.

CHAPTER 6 – EXPERIMENT 5:

GENERAL AND SPECIFIC HORSE RACE BETTING EVENTS

The purposes of Experiment 5 are similar to those of Experiment 4. However, it is important to replicate and examine the proposed psychological hypotheses in multiple situations and contexts (Cohen, 1994; Meehl, 1967; Popper, 1959). Thus, a paradigm involving a different type of task within a different context (i.e., betting on the outcome of horse races) was employed in Experiment 5. The current experiment differs from Experiment 4 in that the participants, themselves, were both actors and observers of the event that they experienced (as are many other types of events that one may bet on, such as betting on the outcome of a sporting event).

A second purpose of Experiment 5 was to examine whether or not counterfactual responses to specific versus general events must be self-generated in order to demonstrate the mediating role of counterfactual thinking. That is, do counterfactuals play as potent a role in reactions to general and specific events when counterfactuals are provided by other observers (“spoon-fed”) as do counterfactuals that are self-generated? Answering this question would help to determine if a counterfactual response itself, regardless of its origin, is a key factor in the generation of different reactions to general and specific events. At first glance, one may argue that, if counterfactual thoughts affect one’s comparison case for an event (which subsequently affects perceptions and judgments), then counterfactual thoughts should do so even when they are not initially generated by the perceiver. Thus, an alternative to reality should have the same effect on one’s judgments, regardless of whether it is entirely self-generated or whether it is information provided by another observer of the event.

Although intuitive, this particular notion is not supported by the available social cognition literature. For instance, studies that have examined the effect of counterfactual thoughts on persuasion have revealed that attitude changes persist over time only when counterfactual responses are self-generated, and not when counterfactuals are spoon-fed to social perceivers (Tal-Or, Boninger, Poran, & Gleicher 2004). Mussweiler and Neumann (2000) have concluded that judgments of social targets are more likely to be consistent with internally generated cognitions compared to externally provided knowledge. Their studies suggest that people are relatively better equipped with the cognitive resources to correct for the influence of externally provided primes than they are to correct for the influence of internally provided primes when judging ambiguously described social targets. It is also possible that people are motivated to react against “outside” influences.

However, earlier experiments have shown that people’s opinions can move toward the position implied by reading scripts or by sincerely playing the role of others (Zimbardo, 1965). In a somewhat related vein, McGuire and Papageorgis (1961) showed that, under some conditions, actively participating in generating counterarguments, as opposed to using the arguments provided by another person, does not always lead to more potent inoculations against persuasive attempts (although McGuire (1964) reported that active participation of defense generation typically augments the internalization of attitudes). On the other hand, a more recent study conducted by Wänke, Bless, and Biller (1996) examined the effects of generating arguments that support one’s attitude toward a specific issue versus simply reading arguments generated by other individuals. These researchers found clear evidence for the notion that the subjective experience associated

with generating one's own thoughts is more influential to the construction of his or her attitudes compared to the experience of reading another person's arguments. Wänke and her colleagues demonstrated counterintuitive, ease of generation effects for those participants who generated their own arguments. That is, participants who generated their own arguments reported attitudes that reflected the implications of their argument generating experience. They later reported attitudes that conformed to their arguments, but only after completing an easy argument generation task (generating three arguments) and not after completing a more difficult argument generation task (generating seven arguments). For participants who read arguments generated by other participants, a "number" heuristic effect was supported. The attitudes of these participants were more strongly influenced by the number of arguments they read for or against the issue, seemingly because they lacked the subjective experience of ease or difficulty that accompanies self-generated arguments.

Thus, the available research that has examined self-generated versus other-generated cognitions suggests that a difference in the potency of self-generated versus other-generated counterfactuals for judgments may also exist. Thus, the current experiment implemented a third condition in addition to the general and specific event conditions, namely a general event + "spoon-fed thoughts" condition. Participants assigned to this condition were presented with the same information that general event condition participants received. In addition, general event + spoon-fed thoughts condition participants were exposed to the thought-listing responses recorded by specific event condition participants. In light of earlier empirical findings, it was hypothesized that the pattern of data provided by specific event condition participants would differ

significantly from that of the data provided by general event + spoon-fed thoughts condition participants. However, even if counterfactual responses affect judgments when they are not self-generated (as would be the case for general event + spoon-fed thoughts condition participants), this would be an important finding.

Overview of Experiment

All participants were informed that they would view pre-recorded videos of seven professional horse races, and that they were to imagine that these races were taking place live. Participants were informed that they would be given some information about each horse in each race before placing a two-dollar bet (using fake money given to them by a laboratory assistant) on a horse to win, place, or show (finish first, second, or third, respectively). It was explained to participants that their task was to win as much fake money as possible, and that they would later have a chance to win a \$30 drawing in another part of the experiment. It was made clear to participants that their chances of winning the \$30 drawing depended on how well they performed in their betting. Participants then indicated their pre-race expectations regarding how many races out of six they expected to place a bet that won them money, and how confident they were in this estimation.

Participants were assigned to one of three experimental conditions (specific event, general event, or general event + spoon-fed thoughts) in which they gained information about each of the first six of seven horse races. Specific event condition participants viewed videos of the first six races and the payoffs, whereas general event condition participants were provided only with the general results of each race (the order in which the horses finished and the payoffs). General event + spoon-fed thoughts event condition

participants were provided with the same information as those participants assigned to the general event condition, but they were also provided with thought-listing responses recorded by participants assigned to the specific event condition who selected the same horse.

At the conclusion of each race (or after being informed of the result – depending on condition), payouts (in the form of fake money) were awarded to participants on the basis of the horse they selected, the horse's finishing position, and the horse's pre-race odds. All of the participants were instructed to list their thoughts at any time after learning about the results of each race. As expected, the previous experiments (Experiments 1, 2, and 4) supported the notion that counterfactual thinking affected the dependent variables regardless of whether or not participants were asked to explicitly list their thoughts, as evidenced by the null effects of thought-listing condition. To simplify the overall design, a thought-listing manipulation was not employed in the current experiment.

At the conclusion of the first six horse races, participants were informed that, for the next phase of the experiment, they would view a video of a seventh and final race (all participants viewed this race). After being informed that they had "100 tickets," they were informed that their tickets would be entered into an electronic drawing for \$30 at the conclusion of the entire experiment. It was explained further that the more tickets they had to enter, the better their chances would be of winning the drawing. For a chance to increase their number of tickets, all participants were permitted to place a bet on a horse for the final race using any number of their 100 tickets. They were then informed that if they placed a bet, the number of tickets they could enter in the drawing depended

on the pre-race odds, the number of tickets they bet, and the payout schedule (similar to the previous races). Participants were also asked to indicate the subjective confidence they felt that the horse they picked would finish in first, second, or third.

Hypotheses

Six separate hypotheses were tested in Experiment 5:

Hypothesis 1: Participants assigned to the specific event condition were expected to generate a greater number of upward counterfactual thoughts in response to the event than were participants assigned to the general event condition. That is, a main effect of type of event on the number of upward counterfactuals generated in response to the event was expected to emerge. As with Experiment 1, this hypothesis was based on Sherman et al.'s (1999) use of norm theory, which argued that specific events tend to increase one's attention toward mutable features more than general events. Downward counterfactuals may have also emerged, especially in the case of a close win by a horse that was picked to win. However, because most participants were likely to experience more losses than wins, most of the counterfactual responses listed by participants were expected to be upward counterfactuals.

Hypothesis 2: Participants assigned to the specific event condition were expected to place a greater number of their tickets as bets on the horse they picked to win the final race, and report greater subjective confidence in their bets, than were participants assigned to the general event condition. In other words, a main effect of type of event (general or specific) on both dependent variables was expected to emerge. This hypothesis was based on the assumption that Hypothesis 1 would be supported. If in fact specific event participants focused more on how the previous races could have, would

have, or should have turned out differently, they should be correspondingly more likely to place greater bets, and feel greater subjective confidence in winning the final race.

Hypothesis 3: Participants assigned to the specific event condition were expected to place a greater number of their tickets as bets on the horse they picked to win the final race, and report greater subjective confidence in their bets, than were participants assigned to the general event + spoon-fed thoughts condition. In other words, a main effect of type of event (specific or general event + spoon-fed thoughts) on both dependent variables was expected to emerge. This hypothesis was based on the research findings outlined above (Mussweiler & Neumann, 2000; Tal-Or et al., 2004; Wänke et al., 1996), which suggested that counterfactuals should have an effect on reactions to an event, especially when those counterfactuals are self-generated. Thus, self-generated counterfactual responses, as opposed to other-generated counterfactuals responses, were expected to have a more potent influence on the construction of comparison standards used by participants.

Hypothesis 4: The relative frequency of upward counterfactual responses to an event was expected to be a stronger predictor of post-event judgments than were pre-event expectations for specific event condition participants, but pre-event expectations were expected to be stronger predictors of post-event judgments than was upward counterfactual response frequency for general event condition participants. As described in Hypothesis 6 of Experiment 1, this hypothesis was based on the notion that the cognitive processing difference (stated in Hypothesis 1) results in different comparison cases for the two types of event (general and specific).

Hypothesis 5: The relationships between the type of event (general or specific) and post-event judgments were expected to be statistically mediated by the relative frequency of upward counterfactual responses. If comparison cases for specific event condition participants were constructed through the mutation of specific event information, and comparison cases for general event condition participants were constructed on the basis of pre-event expectations, counterfactuals should have mediated the relationships between the type of event and post-event judgments. Because it was hypothesized that a different factor (expectancies versus counterfactuals) should have operated depending on the type of event (general versus specific), two separate interaction effects were also expected to emerge such that: 1) the relationships between pre-event expectations and the dependent variables were stronger for general event condition participants than for specific event condition participants; and 2) the relationships between counterfactual frequency and the dependent variables were stronger for specific event condition participants than for general event condition participants.

Method

Participants

A total of 144 undergraduate students, enrolled in psychology courses at Indiana University, participated in Experiment 5 for partial fulfillment of course credit. Only participants who were familiar with horse racing and betting were asked to participate in this experiment. Experimental sessions involved a maximum of six participants.

Procedure

Upon arrival, participants were greeted by a laboratory assistant who gave them a brief oral introduction to the experiment. The experiment was introduced as a study of “what people think about as they watch sports.” All experimental materials were presented using MediaLab v2004 Research Software (Jarvis, 2004). The instructions of the experiment were self-paced, and participants advanced the instructions by pressing the space bar or a response key.

Participants were informed that they would be presented with the outcomes of six professional horse races, and that they were to imagine they were betting on these races at the track. Each race consisted of eight horses. Participants were informed that they would be given some information about each horse in each race before placing a two-dollar bet (using fake money provided by a laboratory assistant) on a horse to win, place, or show (finish first, second, or third, respectively). It was explained to participants that their task was to win as much fake money as possible, and that they would have a chance to win a \$30 electronic drawing in another part of the experiment. It was made clear to participants that their chances of winning the \$30 drawing depended on how well they performed in their betting.

A brief tutorial explaining the general betting rules was also given to participants before the first race. Specifically, it was explained that, if they picked a horse to win, the horse must win the race in order to receive the win-payout. If they picked a horse to place, the horse must win or place, but in either case they would receive the place-payout. If they picked a horse to show, the horse must win, place, or show, but in any case they

would receive the show-payout. An example of a finish position and payout schedule (see Figure 5.1) was displayed to participants when these details were being described.

Before each race, participants were provided with accurate information about each of the actual horses, including the names of the horses, the racing numbers of the horses, the number of races run by each horse, the breakdown of their total wins, places, and shows, and their fastest time at the same distance to be run in the upcoming race (see Figure 5.2 for an example of the race program). When the fastest time of a horse at the distance to be run was unavailable, because it had yet to run the distance of the upcoming race, “First race at this distance” was displayed for the horse. Participants were also provided with the closing odds (e.g., 1/1; 3/1; 5/2; 25/1) that were actually posted at the time of each race. Payouts for each race, made in fake money, were based on the payout schedule given at the end of the actual race. Participants were assigned to one of three experimental conditions (specific event, general event, or general event + spoon-fed thoughts) in which they gained information about each of races.

Before learning about the horses of the first race and placing bets, participants indicated their pre-race expectations regarding how many races out of six they expected to place a bet that would win them money. In addition, they were asked to indicate how confident they were in their estimation on a 7-point scale anchored at *not at all confident* (1) and *extremely confident* (7), and how successful they thought they would be at performing the task on a 7-point scale anchored at *not at all successful* (1) and *extremely successful* (7).

Specific event condition. Specific event condition participants viewed videos of the first six races. All of the participants were instructed to list any thoughts that went through their minds during their race or after the outcome of the race was discovered.

General event condition. The same procedures that were used for participants assigned to the specific event condition, involving the information given before each race and the payouts, were also used for participants assigned to the general event condition. However, general event condition participants did not view any of the videos of the first six races. These participants were provided only with the general results of each race (the order in which the horses finished). Specifically, they were instructed to review the finish position and payout schedule for each race. The same thought-listing procedures used for participants assigned to the specific event condition were used for participants assigned to the general event condition.

General event + spoon-fed thoughts condition. General event + spoon-fed thoughts condition participants were exposed to the same procedures and information as those participants assigned to the general event condition. However, these participants were also provided with thought-listing responses listed by a participant assigned to the specific event condition who picked the same horse. That is, general event + spoon-fed thoughts participants were randomly yoked to a thought-listing response set provided by a specific event condition participant. General event + spoon-fed thoughts participants were instructed to review the statements listed by a specific event condition participant directly after reviewing the finish position and payout schedule for the race.⁸ These statements were presented to general event + spoon-fed thoughts condition participants as

comments made by another person who bet on the same horse and actually watched the race.

Dependent variables. At the conclusion of the first six horse races, participants were informed about how much fake money they had attained over the course of the horse race betting task. They were then informed that, for the next phase of the experiment, they would view a video of a seventh and final race (all participants viewed this race). At this point, all participants were informed that they now possessed 100 tickets to be entered into an electronic drawing for \$30 at the conclusion of the entire experiment. It was explained further that the more tickets they had to enter, the better their chances would be of winning the drawing. For a chance to increase their number of tickets, all participants were permitted to place a bet on a horse for the final race using their tickets (any amount between 10% and 100% of their available tickets). They were informed that if they placed a winning bet, the number of tickets they won would depend on the pre-race odds, the number of tickets they bet, and the payout schedule (as were the previous six races). Participants were also asked to indicate the subjective confidence they felt that the horse they picked would finish in first, second, or third using a 7-point scale anchored at *not at all confident in winning this bet* (1) and *extremely confident in winning this bet* (7). The bet placed and the rating of confidence served as the primary dependent variables of the experiment. The seventh and final race was then displayed to all participants. Participants were then debriefed and thanked for their participation. Following the data collection phase of the experiment, an electronic drawing was conducted and the winning participant was contacted to receive the award.

Design and Analyses

Experiment 5 employed a between-groups (type of event: general, specific, or general + spoon-fed thoughts) factorial design. Dependent variables, and the influences of the type of event, pre-event expectancies, and counterfactuals, were examined using correlational and hierarchical multiple regression analyses. The actual winnings (or losings) over the first six races were also included as a covariate in these analyses.

Results

Preliminary Analyses

Importantly, participants in the three event type conditions (general, specific, and general + spoon-fed thoughts) did not differ in their pre-event expectations about the horse race betting task (see the top half of Table 5.1). That is, regardless of event type condition, participants held relatively equal expectations about their expected performance on the task, and held relatively equal levels of confidence in their expected levels of success. However, the ANOVA for expected number of winning bets nearly reached a marginal level of significance ($p = .11$), and so it was considered as a covariate in the test of differences between the event conditions among the dependent variables. Also, as shown in the middle of Table 5.1, the number of winning bets participants had placed and the total cash winnings they accumulated over the course of the six races did not differ across the type of event conditions.

Intercoder Agreement of Thought-Listings

A total of 2,880 thoughts were listed by participants. Each thought-listing response was coded by two separate coders as a counterfactual response (upward or downward) or a non-counterfactual response. Each response was coded with respect to

the context in which the response was listed (the type of bet placed and the finish position of the horse bet on). For instance, the response “My horse should have won by a larger margin,” was not coded as a counterfactual response for a participant who had placed a win bet on the winning horse; nor was the response “My horse almost won the race,” for a participant whose horse actually finished 6th, 7th, or 8th. Only one of the coders appeared to utilize the downward counterfactual as a category for coding thought-listing responses (total = 14). The overall agreement between the two coders was 95.86%; Spearman’s $\rho = .70$, $p < .001$, Kappa = .70, $p < .001$ (the 14 downward counterfactuals were excluded from the Kappa test as it requires a symmetric table with matching values for each variable). The category agreement index for upward counterfactual responses was .73, whereas the category agreement index for non-counterfactual responses was .98.

Due to this suboptimal level of agreement between coders, especially for counterfactual responses, a third coder was used to resolve the disagreements. A representative selection of counterfactual and non-counterfactual responses submitted by participants is displayed in Table 5.2.

Upward Counterfactuals

The average frequency of upward counterfactuals listed by participants was 2.66. This total was out of 30 possible thoughts listed (a maximum of five thoughts could be listed following each of the six races). With respect to the fact that participants placed 2.28 winning bets (out of six possible), on average, the total upward counterfactual frequency may be considered moderate to high.

As stated earlier, participants assigned to the specific event condition were expected to generate a greater number of upward counterfactual thoughts in response to

the event than were participants assigned to the general event condition (Hypothesis 1). This hypothesis was tested using an ANCOVA controlling for pre-event expectancy and number of winning bets placed. To simplify the remainder of the current and subsequent experimental analyses, a single pre-event expectancy variable was created by summing the z -scores of each of the three pre-event expectancy measures (average $r(142) = .53, p < .001$). These variables were included as covariates because high expectations and confidence were expected to increase the frequency of counterfactual thinking for the reasons outlined in the Results section of Experiment 4 (i.e., high expectations can lead to greater expectancy disconfirmation, triggering counterfactual thinking). Hypothesis 1 was supported by a main effect of event type on the frequency of upward counterfactuals listed by participants, $F(2, 139) = 15.24, p < .001$. Specifically, specific event condition participants listed a greater number of upward counterfactuals ($M = 3.35, SE = 1.87$) than did general event condition participants ($M = 1.37, SE = .29$), $t(139) = 4.93, p < .001$. Participants assigned to the general event + spoon-fed thoughts condition were also exposed to more upward counterfactuals ($M = 3.26, SE = .29$) than the participants in the general event condition had listed, $t(139) = 4.71, p < .001$. The pre-event expectancy composite variable and the number of winning bets failed to reach statistical significance as covariates.

As in earlier experiments, a Bayesian corrected proportion was also computed for upward counterfactual frequency. In the current experiment, the mean proportion of upward counterfactuals across the entire was .15; therefore, $b = 6.5$ (see p. 27). According to this measure of upward counterfactual frequency, Hypothesis 1 was again supported by a main effect of event type on the proportion of upward counterfactuals

listed by participants, $F(2, 139) = 19.63, p < .001$. Specifically, specific event condition participants listed a greater proportion of upward counterfactuals ($M = .42, SE = .16$) than did general event condition participants ($M = .29, SE = .13$), $t(139) = 5.03, p < .001$. Participants assigned to the general event + spoon-fed thoughts condition were also exposed to a greater proportion of upward counterfactuals ($M = .45, SE = .07$) than the participants in the general event condition had listed, $t(139) = 6.19, p < .001$. The pre-event expectancy composite variable and the number of winning bets again failed to reach statistical significance as covariates. Although all subsequent analyses examining upward counterfactual frequency as a moderator or mediator of other effects were computed using the Bayesian corrected proportion, the term “upward counterfactual frequency” is retained in the report of these analyses for ease of presentation.

Unlike Experiment 4, the discrepancy between expected number of winning bets and the actual number of bets won (actual - expected) was not significantly correlated with upward counterfactual frequency. However, the differences between playing blackjack and betting on horse races are great, and there are several more aspects of a horse race that may be mutated compared to those of a game of blackjack (the odds of winning a game of blackjack may also be significantly higher than those of winning a bet on a horse race). Thus, disconfirmed expectancies may be a very salient trigger of counterfactual thinking in a simple game of blackjack, whereas in horse race betting, disconfirmed expectancies may be only one of several triggers of counterfactual thinking. Counterfactual thinking in the current experiment appears to have been caused by the nature of the event manipulation, as the frequency did not appear to be augmented by disconfirmed expectations.

Confidence Regarding the Bonus Race

As stated in Hypothesis 2 and Hypothesis 3, participants assigned to the specific feedback condition were expected to place a greater number of their tickets as bets on the horse they selected to win, place, or show in the bonus race, and report greater subjective confidence in their bets, than were participants assigned to either the general event condition or the general event + spoon-fed thoughts condition (the two dependent variables were correlated positively, $r(146) = .72, p < .001$). Two additional one-way ANCOVAs were conducted for the two measures of confidence pertaining to the bonus race, where type of event condition served as the independent variable. As was done in the examination of upward counterfactual frequency, the pre-event expectancy composite variable and the number of winning bets were included as covariates. In both tests, the number of winning bets reached marginal significance as a covariate for tickets bet on winning the bonus race, $F(1, 139) = 3.89, p < .10$ ($r = -.12, p < .12$), and statistical significance for subjective confidence in winning the bonus game, $F(1, 139) = 5.47, p < .05$ ($r = -.20, p < .02$).⁹ However, the pre-event expectancy composite variable did not reach significance as a covariate in either test.

With regard to the hypotheses, partial support was found for Hypothesis 2 and full support was found for Hypothesis 3. As displayed in the bottom third of Table 5.1, a main effect of event type was found for tickets bet on winning the bonus race and subjective confidence in winning the bonus game. However, the number of tickets bet on the bonus race was statistically equivalent among the specific event condition and the general event + spoon-fed thoughts condition. Participants assigned to both of these conditions bet more tickets than participants assigned to the general event condition.

When it came to subjective confidence in their bets for the bonus race, specific event condition participants reported greater confidence than both of the other event conditions.

Moderation of Upward Counterfactuals

The final two hypotheses regarding moderation of pre-event expectations and moderation and mediation of post-event counterfactual responses were examined using hierarchical multiple regression analyses according to the procedures recommended by Cohen and Cohen (1983). In each of these analyses, the two confidence measures served as the dependent variables.

Pre-event expectations and upward counterfactual frequency were tested as moderators of the relationship between event type and the two confidence measures in four separate hierarchical multiple regression models using the procedures recommended by Cohen and Cohen (1983). All subsequent analyses employed event type as a dummy coded variable (general event = 0; specific event = 1) and continuous variables were centered. For each hierarchical multiple regression model, event type and one of the proposed moderators were entered in step 1 and their interaction term was entered in step 2.

There was no evidence of moderation via pre-event expectancies or upward counterfactuals in the current experiment. An additional moderator (number of winning bets) was tested, but the same null interaction effect was found. All of these analyses used only those participants assigned to the general and specific event conditions. Using two dummy code variables, the same tests were computed using all three event types. Still, no evidence for moderation was observed.

Mediation of Upward Counterfactuals

Next, mediation analyses were examined with the current data according to the procedures outlined by Baron and Kenny (1986). In each of these analyses, the two measures of confidence regarding the bonus race served as the dependent variables and the number of games of blackjack won was controlled for in an initial step. As stated earlier, upward counterfactuals should mediate the relationships between feedback type and post-event judgments regarding the bonus game (Hypothesis 5). For these analyses, only the data from the general and specific event conditions were used.

First and foremost, there was only one relationship for upward counterfactual frequency to possibly mediate: the relationship between event type and tickets bet on winning the bonus race, $\beta = .28$, $t(94) = 2.83$, $p < .01$. The relationship between event type and subjective confidence for the bonus race did not reach statistical significance, $\beta = .15$, $t(94) = 1.51$, $p = .13$. However, after controlling for pre-event expectancy and number of winning bets in an earlier step, event type did reveal a significant effect for subjective confidence in the bonus race bet, $\beta = .20$, $t(92) = 1.99$, $p < .05$.

Upward counterfactual frequency was tested as a mediator of the relationships between event type and the two dependent variables (see Figure 5.3). As indicated earlier in a one-way ANOVA, upward counterfactual frequency was significantly associated with the specific event condition, $\beta = .39$, $t(94) = 4.08$, $p < .001$. As displayed in the top panel of Figure 5.3, when both event type and upward counterfactual frequency were entered into the regression model simultaneously, event type was no longer a significant predictor of tickets bet on winning the bonus race. Yet, upward counterfactual frequency was a significant predictor of tickets bet on winning the bonus race. A modified Sobel

test showed that the reduction in the effect of event type on tickets bet on winning the bonus race was a significant reduction, $z = 2.19, p < .05$.

Upward counterfactual frequency failed to mediate the relationship between event type and subjective confidence in the bonus race bet as shown in the bottom panel of Figure 5.3. In the model predicting subjective confidence in one's bet on the bonus race with event type, after controlling for pre-event expectancy and number of winning bets in an earlier step, upward counterfactual frequency reduced the effect of event type to non-significance, $\beta = .15, t(91) = 1.35, ns$. However, upward counterfactual frequency was not a significant predictor in this model either, $\beta = .09, t(91) = .85, ns$. This pattern of results (i.e., mediation by upward counterfactuals for tickets bet but not for subjective confidence) is similar to that of the pattern of results found in the blackjack experiment (Experiment 4).

Follow-up Horse Racing Experiment

As discussed in Experiments 2 and 4, upward counterfactuals in response to undesirable events may differ on another dimension. That is, rather than differing in their frequency of upward counterfactual responses, observers of general and specific events may differ in their conviction or confidence that simulated alternatives could have, would have, or should have actually occurred. This type of thought confidence may also serve as a mechanism to impact judgments of recently experienced events and similar, future events. It was not feasible to ask participants to respond to counterfactual thought confidence items in each of the previous experiments as such items may have triggered counterfactual thinking itself and subsequently affected the dependent variables. Doing so may have defeated one of the goals of the current investigation, which was to examine

spontaneous reactions to general and specific events rather than ones induced by the experiment.

To this end, 48 participants were recruited to participate in a modified version of Experiment 5. Only the general event and specific event conditions were employed and the same basic procedures used in Experiment 5 were employed here. Participants were asked to respond to five additional items in reference to their confidence in a better performance on the horse race betting task. These items were embedded between the outcome of the sixth race and the presentation of program information for the bonus race.

Specifically, participants were reminded that they began the horse race betting task with \$12, and were informed about their current cash total. Next, they were asked to respond to five counterfactual thought confidence items: 1) How confident are you that your performance on the horse race betting task could have been better? on a 7-point scale anchored at *not at all confident* (1) and *extremely confident* (7); 2) How sure are you that you should have performed better on the horse race betting task? on a 7-point scale anchored at *not at all sure* (1) and *extremely sure* (7); 3) How sure are you that the horses you bet on could have or should have performed better in the races? on a 7-point scale anchored at *not at all sure* (1) and *extremely sure* (7); 4) How much do you feel that your choices in the races, or the outcomes of the races, might have been different? on a 7-point scale anchored at *not at all* (1) and *very much* (7); and 5) How easy is it for you to imagine doing something, or not doing something, that would have led to a greater cash total? on a 7-point scale anchored at *not at all easy* (1) and *extremely easy* (7).

It was hypothesized that participants assigned to the specific event condition would report greater confidence that a more desirable outcome on the horse race betting

task could have, should have, or might have occurred than would participants assigned to the general event condition. Upward counterfactual frequency should also be correlated with counterfactual confidence. Both upward counterfactual frequency and counterfactual confidence were also expected to mediate any relationships found between the type of event and the dependent variables. These expectations were tested using a series of ANOVA, correlation, and multiple regression analyses.

To simplify the analyses, the five counterfactual thought confidence items were combined into a single value (i.e., averaged). However, before doing so, the items were examined for internal consistency. Only items 1, 2, and 4 were significantly correlated with each other; this combination of items was also associated with the greatest internal consistency (Cronbach's $\alpha = .71$). As expected, participants assigned to the specific event condition reported greater counterfactual thought confidence ($M = 4.93$, $SD = 1.17$) than did participants assigned to the general event condition ($M = 3.83$, $SD = 1.21$), $F(1, 46) = 10.14$, $p < .01$; $r(46) = .43$, $p < .01$.

As was found in Experiment 5, participants in the specific event condition listed more upward counterfactuals ($M = 2.67$, $SD = 2.75$) than did participants in general event condition ($M = 1.29$, $SD = 2.11$), $F(1, 46) = 3.78$, $p < .05$. A Bayesian corrected proportion was also computed for this experiment. In the current experiment, the mean proportion of upward counterfactuals across the entire sample was .09; therefore, $b = 11$ (see p. 27). According to this measure of upward counterfactual frequency, participants assigned to the specific event condition reported a greater proportion of counterfactual thoughts ($M = .11$, $SD = .05$) than did participants assigned to the general event condition ($M = .07$, $SD = .05$), $F(1, 46) = 5.25$, $p < .05$. Although all subsequent analyses

examining upward counterfactual frequency as a moderator or mediator of other effects were computed using the Bayesian corrected proportion, the term “upward counterfactual frequency” is retained in the report of these analyses for ease of presentation.

Surprisingly, upward counterfactual frequency and counterfactual thought confidence reached only marginal significance, $r(46) = .26, p = .07$. However, upward counterfactual frequency did correlate significantly with the first counterfactual thought confidence item, $r(46) = .29, p < .05$. Although these conclusions warrant some caution, it is reasonable to expect multiple, qualitatively different, counterfactuals (i.e., not simply the same counterfactual repeated multiple times) to increase one’s confidence that an alternative outcome was actually likely to occur. It is also important to remember that each thought listed in the thought-listing task was spontaneous to the extent that participants were asked only to list their thoughts about the races and not to list what might have or could have occurred. Participants were not asked to consider what might have been; they were asked only to list any thoughts that went through their minds as they discovered the results of the races. In this respect, and with respect to the nature of the event itself, there are an infinite number of things that a participant might have thought about or commented on. It is possible that many of the participants did generate upward counterfactual thoughts well after the thought-listing tasks had ended. Such thoughts would be expected to contribute to counterfactual thought confidence, yet they would not have been detected in the current experiment.

More importantly, it was essential to determine whether or not counterfactual thought confidence mediated the relationship between event type and the dependent variables, as upward counterfactual frequency had in earlier experiments. First, event

type significantly predicted tickets bet on winning the bonus race ($\beta = .27$, $t(46) = 1.96$, $p = .05$), but did not significantly predict subjective confidence in winning the bonus race bet ($\beta = .13$, $t(46) = .88$, ns). According to Baron and Kenny's (1986) recommendations, there was only one event type/dependent variable path to mediate in this case. More recently, researchers (Efron & Tibshirani, 1993; Shrout & Bolger, 2002) have argued that the first requirement of mediation recommended by Baron and Kenny is not entirely necessary, especially when there is an a priori belief that the effect of the initial predictor of the criterion is small. In each of the previous experiments that included a test of the effect of event type on subjective confidence for a similar, future event (i.e., a rematch, a new trivia test, a bonus game of blackjack, or a bonus horse race), the effect was small (usually $R^2 = .04$ or $.05$). Thus, mediation analyses were carried out for both of the dependent variables.

Interestingly, when counterfactual thought confidence was tested as a mediator of the relationship between event type and tickets bet on the bonus race, its presence in the model statistically reduced the effect of event type to nonsignificance, yet failed to reach significance itself. One possibility for this null finding is inadequate sample size. Although the two event type conditions differed in their levels of counterfactual thought confidence, a primary source of counterfactual thought confidence (upward counterfactual frequency) failed to correlate significantly with confidence (as stated above). Thus, it is also possible that counterfactual confidence may not have reached a level necessary to affect one's bet after controlling for the type of event.

Ignoring the first requirement of mediation according to Baron and Kenny (1986), counterfactual thought confidence was strongly associated with subjective confidence in

winning the bonus race bet, $\beta = .56$, $t(45) = 4.03$, $p < .001$. This same relationship was found even when controlling statistically for event type, expected number of bets to be won, and actual number of bets won. Interestingly, after splitting the data by event type condition and controlling statistically for expected number of bets to be won and actual number of bets won, the relationship between counterfactual thought confidence and subjective confidence in winning the bonus race remained significant, but only among participants assigned to the specific event condition ($\beta = .45$, $t(20) = 2.07$, $p < .05$), and not among participants assigned to the general event condition ($\beta = .42$, $t(20) = 1.92$, *ns*).

Discussion

Several of the hypotheses of Experiment 5 were supported. As in earlier experiments, upward counterfactual thoughts emerged more frequently in response to a specific event than in response to a general event. Participants assigned to the specific event condition were more confident in terms of the number of tickets they were willing to place as a bet, and in terms of their subjective confidence for the bet, than were general event condition participants.

An apparent inconsistency was found among the general event + spoon-fed thoughts condition, with regard to their number of tickets placed as a bet and their subjective confidence for their the bonus race bet. When it came to their bet, they looked much like the specific event condition participants, but when it came to their subjective confidence in their bet, they looked more like the general event condition participants. Thus, exposure to the thoughts of another individual, some of which were likely to be upward counterfactuals, seemed potent enough to affect a participant's bet on the bonus race, but not potent enough for them to feel confident about it. This pattern of findings

resembles that of the blackjack experiment (Experiment 4) to the extent that upward counterfactuals (associated with the specific feedback condition) mediated the relationship between feedback type and one's bet on a bonus game, but not the relationship between feedback type and subjective confidence.¹⁰ However, there is some reason to believe that general event + spoon-fed thoughts condition participants possessed less counterfactual thought confidence. The results of the follow-up experiment are essential to such an argument to the extent that it showed counterfactual thought confidence to be a strong predictor of subjective confidence for one's bet on the bonus race. General event + spoon-fed thoughts condition participants were exposed to the number of counterfactuals that specific event condition participants had listed, yet spoon-fed participants were probably not as likely to feel as confident that they might have performed better on the horse race betting task because they were not exposed to the specific features of the event that would be expected to boost such confidence. Any particular set of thought-listings that spoon-fed participants read may or may not have given some clues as to the specific features of the event (e.g., how close their horse was to placing). However, another stranger's comments that allude to specific features of the event are not as potent as is specific event information gained from actually watching the race. On the other hand, with the significant increase in considering counterfactual thoughts, general event + spoon-fed thoughts condition may have been prompted to at least feel as though they should have performed better at the task (attained more tickets for the drawing), while at the same time not having the specific event information that may have permitted them to feel confident about such a notion. Thus, specific event condition participants may have placed significantly higher bets because they felt

relatively more confident in their horse race betting ability, whereas spoon-fed participants may have employed a “go for broke” strategy without corresponding confidence in winning such a bet. Further, it should not be too surprising that a more behavioral-based item (bet placed on for the bonus race) and subjective confidence for the bet showed some inconsistencies across the conditions given the large body of literature revealing the inconsistencies between behavioral, affective, and cognitive components of attitudes (see Breckler, 1984, and Zanna & Rempel, 1988), especially among a group of individuals who received a mixture of general event information via their own experience and pieces of specific event information in the form of specific event thought-listings constructed by another source.

Correlational analyses showed that pre-event expectancies appeared to be more relevant to judgments following a general event, whereas upward counterfactual frequency appeared to be more relevant to judgments following a specific event. However, when participants were exposed to the general event as well as thought responses listed by specific event condition participants, neither variable appeared to be linked to the dependent variables. Instead, the number of winning bets was correlated with subjective confidence in the bonus race bet. It seems feasible to expect this correlation to be positive, as better performance should suggest to an individual that they have some skill or luck at the task. Subsequently they should feel more confident in similar, future tasks. Yet, the relationship between winning bets and subjective confidence was negative. Thus, it seems that the opposite causal direction is also possible. That is, people who have more experience with or knowledge about horse race betting do perform better than others with less experience and knowledge, but they are

well aware of the level of difficulty involved in consistently picking winning horses. Thus, they appropriately place less confidence in their bets than others with less experience and knowledge. In any case, the correlation between the number of winning bets and subjective confidence for the bonus race among the general event + spoon-fed thoughts condition participants is suggestive of a more complex mediational event/reaction process than first proposed.

Although the general event + spoon-fed thoughts condition was a hybrid of two different types of event conditions, it did have some “real world” commonalities. For instance, an individual may learn about the general outcome of her favorite tennis player’s match (general event), observe the match (specific event), or read about the match in a newspaper article whereby she learns of the general outcome and some of the specific features (some that may be counterfactualized) written by the author. Thus, the processes involved in reacting to general events, while also being exposed to the thoughts of others, may be worthy of studying in its own right. In fact, the majority of events are experienced in a social context. If people are provided with the opportunity to interact with others, as their reactions to events develop, they may increase their confidence in their thoughts through this interaction as demonstrated in group polarization-like effects (see: Myers & Lamm, 1976; Visser & Mirabile, 2004) or go so far as to adopt another person’s reactions as demonstrated in two-factor emotion-like effects (see Schachter & Singer, 1962). These effects may occur in contexts much like that experienced in the general event + spoon-fed thoughts condition.

Neither pre-event expectancies nor upward counterfactual frequency appeared to play a role in the moderation of the relationships between event type and the dependent

variables. Similar to the pattern found in Experiment 4, upward counterfactual frequency mediated the relationship between event type and tickets bet on a bonus race, but not the relationship between event type and subjective confidence in that bet.

One might argue that, just because counterfactuals were directly spoon-fed to participants in the general event + spoon-fed thoughts condition, this does not mean that they did not generate some of the same reactions themselves. However, this possibility seems unlikely. Essentially, the two conditions were exposed to different frames of the same event. If the general event + spoon-fed thoughts condition generated the same cognitive reactions as did the specific event condition, then the general condition would not have been likely to show a difference from the specific event condition in their frequency of upward counterfactuals either; but this, in fact, was not the case.

Another surprising finding of Experiment 5 was that the number of winning bets was negatively (marginally) related to tickets bet on winning the bonus race and negatively related to subjective confidence in winning the bonus race. That is, the more bets that participants had won during the first six races, the less confident they were in winning the bonus race. These negative correlations appeared to be driven mainly by the data from the participants assigned to the general event + spoon-fed thoughts condition. The fact that the number of winning bets did not correlate significantly with tickets placed as a bet, but did with subjective confidence, for spoon-fed participants partially supports the argument made earlier that these participants were less confident for the bonus race in terms of their subjective confidence than they were in terms of the tickets they were willing to place as a bet (despite winning just as many bets as both of the other event conditions).

The negative correlations with regard to number of winning bets may also be explained by the nature of horse race betting, itself, and the strategies employed by experienced bettors. To minimize losses, a common strategy is to make place- or show-bets on the first or second favorite horses, in terms of the set of closing odds (Asch & Quandt, 1986). Experienced bettors are more likely to make win-bets only when they are highly confident in a particular horse. Placing win-bets obviously reduces the chances that they'll end up with a winning bet. The less confident place- or show-bettors may win more races, but their total cash winning often do not amount to much (especially when the bet is made at the minimum of \$2.00). So even though some participants ended the task with relatively greater number of winning bets (in the first six races), their confidence was apparently unaffected by any success they experienced in the first six races, and they tended to be underconfident in the task in general (as evidenced by placing a majority of show-bets). In support of this notion, the number of winning bets was positively correlated with the dominant type of bet placed (i.e., win-, place-, or show-bet), $r(142) = .28, p < .01$. Apparently, people who are knowledgeable about horse race betting are aware that it is not so easy to pick winning horses or win money at the task; and therefore, they are appropriately not so confident in doing so.

Another explanation for the unexpected negative correlations between the number of winning bets and bonus race confidence measures relates to people's misperceptions of representativeness in a series of outcomes (Tversky & Kahneman, 1974). According to the "gambler's fallacy," people sometimes believe that prior random events have an influence on subsequent random events. It seems likely that this misconception applies to horse race betting as well, as people have been shown to make predictions about various

outcomes (e.g., their own performance on a task) based on this misconception of randomness (Aytton & Fischer, 2004; Gilovich, Vallone, & Tversky, 1985). When gambling on a series of outcomes, a winning bet may be considered likely to occur because it has not happened for a period of time, whereas a losing bet may be considered likely to occur for the same reason. Thus, participants who won “their share” of bets may have perceived a loss to be in store by the time they considered the bonus race, whereas participants who had not won very many bets expected a winning bet to be in store – and both groups bet accordingly with corresponding confidence. However, according to the belief in the existence of streaks (the “hot hand” fallacy) in the sequence of random events it is also possible to consider a winning bet as more likely to occur because it occurred recently, and it is possible to perceive a losing bet as more likely to occur for the same reason (especially in cases whereby information about the underlying process generating the events is not perceived to be entirely random; see Burns & Corpus, 2004). Yet, the former possibility seems more likely, as participants were expected to protect their previous winnings (i.e., chances in the form of tickets to enter into the drawing) or make up for missed opportunities.

Future experiments of the role of counterfactual thinking in reaction to general versus specific events may do well to examine other, potentially more sensitive, measures of counterfactual thinking. Other measures of counterfactual thinking such as the simple proportion of counterfactual thoughts may be more representative of the degree to which counterfactuals actually dominate an individual’s cognitive reaction to an event. Earlier experiments in the current investigation varied little in the total number of thoughts listed in general. Thus, counterfactual proportion did not vary as much as it did in the relatively

smaller follow-up experimental sample. It seems possible that the variance in total number of thoughts in response to an event is also likely to vary with the specific type of event being processed. Yet, other types of counterfactual measures may reveal other dimensions of counterfactual thinking that have yet to be fully investigated. For instance, the amount of time that a person ruminates within a counterfactual mindset may serve as an important marker of the weight that people place on such unique cognitions when judging confidence or deciding what to do next time given the event's features, outcome, and reactions to it.

Follow-up Experiment

The follow-up experiment answered questions that the earlier experiments did not. The evidence of the follow-up experiment, although partly mixed, suggested that the counterfactuals that observers of general and specific events generate are different in another way. That is, when people are exposed to enough features of an event that they are likely to counterfactualize it, they appear to hold greater confidence in the likelihood of simulated alternatives than when they are only aware of the general outcome of the event. Interestingly, the difference on this dimension does not appear to be linked to how much people counterfactualize the same event. However, it does seem reasonable to expect multiple, and qualitatively different, counterfactuals to increase one's confidence that an alternative outcome was actually likely to occur. Further, if an individual is afforded the resources and is motivated to cognitively elaborate on such mental simulations, counterfactual thought confidence seems likely to increase (see more discussion on the issue of counterfactual thought confidence in the General Discussion).

CHAPTER 7 – GENERAL DISCUSSION

Overall, the results of the experiments supported the hypotheses drawn from Sherman et al.'s (1999) discussion of dual-process accounts of reactions to general and specific cases. Counterfactual thoughts were observed more frequently in response to specific events than to general events, and pre-event expectations were more clearly linked to reactions regarding general events than to specific events.¹¹ The overall pattern of results suggests that people may construct a standard of comparison influenced by counterfactual thinking (in addition to pre-event event expectations) when reacting to specific events. Standards of comparison for general events appear to be influenced by some combination of pre-event expectations and possibly information gained from recent, relevant events. These standards of comparison also appear to affect decisions regarding similar, future events (e.g., betting on a horse race).

However, evidence for counterfactual thought frequency as a mediator of the relationships between event type and decisions about similar, future events was stronger than that for pre-event expectations as a moderator. In most cases, pre-event expectations simply failed to remain correlated with the outcome variables after controlling for the effect of the type of event (i.e., general vs. specific). Apparently, pre-event expectations are less important to cognitive reactions and decisions regarding similar, future events than is the specificity of the event information to which people are exposed. Some evidence, coming primarily from Experiment 4, suggests that general event condition participants revised their expectations for similar, future events by appropriately adjusting them with respect to the outcomes of recent, relevant events. Unfortunately,

such notions could not be directly tested. Yet, such tendencies would be consistent with Olson et al.'s (1996) model of expectancies.

At this point, the link between event type and counterfactual thinking, as well as that between counterfactual thinking and the types of dependent variables studied in the current investigation, appear to be unique to upward counterfactual thinking. The follow-up experiment to Experiment 5 provided evidence that confidence in counterfactual thoughts is also associated with subjective confidence in decisions regarding similar, future events.

It is important to state that the current model of reactions to general and specific events does not hold that pre-event expectations are unimportant to reactions toward specific events and that counterfactual thought responses are not important to reactions toward general events. The overall pattern of results suggests that pre-event expectations and counterfactual thoughts are sometimes associated with both types of events. Although it may be difficult to dissect the influences of these variables on event reactions and judgments regarding similar, future events, the current investigation suggests that comparison cases for general and specific events are constructed with different information in mind.

There were, of course, other novel findings produced by the current investigation. Previous examinations of counterfactual thought concluded that such cognitive responses were most likely to occur in reaction to exceptional events (Gavanski & Wells, 1989) or when abnormal features were encountered (Kahneman & Miller, 1986; Kahneman & Tversky, 1982). However, the types of events used in the current investigation typically did not involve abnormal features (some of the tennis match clips in Experiment 3 being

the exceptions). Counterfactuals are also thought to be triggered primarily by unexpected outcomes (Roese & Olson, 1995). Each of the current experiments involved events that contained features well within the range of normal expectations. Nothing extremely abnormal, out of the ordinary, strange, or absurd occurred in these events. Yet, counterfactual thoughts were observed in each of the experiments.

In comparison to general events, participants counterfactualized features of the events to a larger degree when exposed to specific event information. However, with the exception of Experiment 3, participants were likely to have been at least moderately motivated to see their in-group member succeed (Experiment 1) or to increase their chances of winning a monetary award (Experiments 2, 4, and 5). Thus, it seems essential for people to desire a particular outcome (i.e., experience of success and desirable outcomes and avoidance of failure and undesirable outcomes) in order for them to be motivated to engage in counterfactual thinking. It seems likely that reactions to events with “real world” consequences may lead to even stronger cognitive and affective reactions than those observed in the current investigation. When personal relevance and involvement are high, and the importance of the situation is also high, people may begin to engage in selective exposure of information and higher levels of cognitive elaboration (Boninger, Krosnick, Berent, & Fabrigar, 1995). This increased elaboration should lead to even greater possibilities of counterfactual thinking. Thus, a moderate to strong personal relevance or interest in the event and a desire for a particular outcome may be the only requirements necessary to prompt counterfactual thinking. Perhaps when people are motivated enough to see a particular outcome unfold, but they experience an undesirable one, they search for an explanation that may involve counterfactual thought

(even when nothing abnormal occurred). Such motivation could be driven by a desire to either experience the simulated alternative (experiential mode of counterfactual thinking; see McMullen, 1997) or to bolster one's expectations for a favorable outcome regarding similar, future events.

For counterfactual thoughts to emerge for the general event observer, yet be just as specific as those counterfactuals generated by the specific event observer, he or she would first have to make additional assumptions to "fill-in" the "missing pieces" of the event and then counterfactualize them (e.g., "The final score of the football game was 31 to 30. Maybe they were penalized unfairly or the team stars didn't play as well as they could have. They should have won that game."). This processing is likely to require greater cognitive resources than one may be willing to expend, and it is clearly just guessing about reality. Further, this process is unlikely to be associated with much counterfactual thought confidence.

Instead, the reactions of general event observers, and their predictions about similar, future events may be influenced by pre-event expectations. Revision of expectations should be considered when exposed to relevant specific event information as well, especially when expectations are disconfirmed. However, as suggested by the current investigation, sometimes pre-event expectations or revised ones are overshadowed by a tendency to upward counterfactualize undesirable outcomes, possibly in the direction of more extreme expectations of an "inevitable," desirable outcome (i.e., as was found in specific event conditions). Although general event observers may engage in counterfactual thinking (as many of the participants in the current experiments did), it is unlikely for counterfactuals generated by general event observers to be as rich,

specific, and potent as those generated by specific event observers. Thus, counterfactual thought specificity and strength may differ between general event and specific event observers who engage in the same degree of counterfactual thinking. In future experiments that investigate the validity of the current model, it may be interesting to examine the impact of the specificity of the counterfactuals generated.

Another possibility is that a difference in counterfactual specificity by event type could serve as a mechanism by which the type of event affects counterfactual thought confidence. This notion was partially (yet inadequately) examined in Experiment 2 when investigating whether or not the level of specificity embedded in the counterfactual responses was responsible for the moderation findings. It appears that the cognitive responses of general and specific event observers may differ on this dimension, but further study is warranted before such conclusions can be supported.

Theoretical Compatibility

In addition to theoretical speculations based on the use of different comparison cases for events (one being shaped by pre-event expectations and one influenced by post-event counterfactual constructions), Sherman et al. (1999) considered several other dual-process theories that may account for the discrepancies observed in reactions to general and specific cases. For instance, assimilation and contrast models offer feasible explanations for discrepancies in evaluations of general and specific categories, such as evaluations of politicians in general versus specific politicians following the prime of scandalous politicians (Schwarz & Bless, 1992). The examples examined by Schwarz and Bless, as well as others (Herr, 1986; Herr, Sherman, & Fazio, 1983; Stapel, Koomen, & van der Pligt, 1996), showed that general categories may be assimilated to a prime,

whereas specific cases are contrasted away from the prime. The primary explanation for these results was that the same prime can serve as a salient standard of comparison leading to different evaluations for general and specific targets. Thus, the explanation has an important similarity to the current conceptualization of reactions to general and specific events. However, the current model departs to the extent that different comparison standards are constructed for general and specific events all together.

Because the current investigation involved general and specific events and people's cognitive responses to those events, rather than evaluations of general categories and exemplars, it seemed more feasible and appropriate to test speculations made by Sherman et al. (1999) on the basis of a theory that also involves comparison standards but could be applied to perceptions of events (i.e., norm theory; Kahneman & Miller, 1986). On the other hand, the current model also has some conceptual similarities to Hamilton and Sherman's (1996) model of impression formation. Their model assumes that impression formation for groups (general) tends to be memory-based (i.e., rely on the recall of previously stored information), whereas impression formation for individual targets (specific) tends to be on-line (i.e., made as the information is received). The current model is compatible with this aspect of Hamilton and Sherman's model to the extent that specific event observers construct or revise their standards of comparison at the time of the event and to the extent that general event observers form a standard of comparison by recalling earlier information. On the other hand, Experiment 4 revealed some evidence for the possibility that general event observers may also revise their standards of comparison at the time of the event by adjusting their new expectations for subsequent events on the basis of recent event outcomes. However, the cognitive

processes involved in forming evaluations of groups or individual targets can be very different from those involved in making predictions about the outcomes of similar, future events.

The current model of reactions to general and specific events also assumes that greater cognitive elaboration, in the form of considering what might have occurred, occurs more frequently in response to specific events than to general events. Because the event type conditions did not differ across experiments with regard to their number of thought listings, and differed only in their counterfactual thought frequencies, it may be more accurate to conclude that cognitive elaboration differs between the two event types on a qualitative dimension rather than magnitude. Such findings are consistent with what may be expected from Petty and Cacioppo's (1981, 1986) elaboration likelihood model (ELM), whereby reactions to general events would tend to be products of peripheral-route processing and reactions to specific events would tend to be products of central-route processing. Thus, general event observers may rely on a simplified, heuristic "feel" of general event information to form judgments, whereas specific event observers may rely more on a careful and deliberative analysis of the event information to form judgments.

Unfortunately, greater cognitive elaboration is not always associated with rational decision making and desirable outcomes. As argued by Sherman and McConnell (1995), more thoughts do not always lead to more rational thoughts, and rational decision making strategies do not always lead to desirable outcomes. Interestingly, some seemingly irrational effects, such as the ease of retrieval effect, have been observed primarily under conditions of high elaboration (Tormala, Petty, & Briñol, 2002). Thus, if reactions to

specific events are more closely linked to high elaboration, it is still possible to form irrational judgments.

In apparent conflict with the ELM-based predictions are the predictions drawn from Epstein's (1983, 1985) cognitive-experiential self-theory (CEST). Specifically, the CEST predicts that a less rational and automatic processing system, whereby people rely on the information's feel, may be associated with judging specific events because such events are typically more emotionally engaging and personally relevant than are general events. According to Epstein's model, a more deliberative and rule-based reasoning approach would be appropriate for reactions to events that are not as personally relevant (general events) because it is typically not necessary that such reactions occur immediately. Thus, one's own philosophical musings and the development of their own worldview may be handled by a rational processing system.

If Epstein's model is correct in that people rely on the feel of information to form judgments about specific cases, it seems possible that strong affective reactions can cause people to elaborate further, given the opportunity and motivation. In fact, under some conditions both positive and negative affect can serve as moderators leading to higher levels of cognitive elaboration (Petty, Cacioppo, Sedikides, & Strathman, 1988; Petty, Gleicher, & Baker, 1991; Wegener, Petty, & Smith, 1995). Thus, even if initial reactions to specific events are more affectively-based, people may still be more likely to counterfactualize specific events than general events given the time, motivation, and resources to engage in cognitive elaboration. Take, for instance, reactions to marketing attempts made by charitable organizations in support of poor and impoverished children. Perhaps simple, evaluative cognitive responses that are less likely to be characterized by

counterfactual thoughts, such as “That’s terrible,” or “What a pity,” are likely to emerge when the persuasive attempt is presented as a general frame. When presented in the form of a specific frame, perhaps cognitive responses are initially likely to be characterized by simple, evaluative cognitive responses, but given the time, motivation, and resources to engage in cognitive elaboration, they may become characterized by counterfactual thought (e.g., “That shouldn’t be,” or “That type of thing shouldn’t happen to that child.”). These possibilities warrant future investigation. Also, in light of such techniques designed to persuade people into action, or to reduce their natural resistance forces that impede action, one possibly interesting route to continue investigation on general and specific cases is to determine whether or not reactions to general and specific events differ in their relation to subsequent attitude-behavior correspondence.

Counterfactual Thought Confidence

Results of the follow-up to Experiment 5 suggest that, when people are exposed to enough features of an undesirable event that make it easier to counterfactualize the event (i.e., specific event), they appear to hold greater confidence in the likelihood of simulated alternatives than when they are aware only of the general outcome of the event. Interestingly, the difference on this confidence dimension does not appear to be linked to how much people counterfactualize the event (one counterfactual appears to be as effective as two or three). However, it does seem reasonable to expect multiple, and qualitatively different, counterfactuals to increase one’s confidence that an alternative outcome was actually likely to occur. Further, if an individual is afforded the resources and is motivated to cognitively elaborate on such mental simulations, counterfactual thought confidence seems likely to increase.

Much like the confirmation bias, whereby people remember information that supports their view, or test those cases that have the best chance of verifying their current beliefs rather than those that have best chance of falsifying them (Klayman & Ha, 1987), people may just as easily confirm their belief in the likelihood of a single simulated alternative to reality. This possibility seems to be especially likely when processing events that provide enough specific information to draw an explanatory hypothesis for the outcome. Borrowing from Koriat, Lichtenstein, and Fischhoff's (1980) model of confidence, the random search for an explanation may be shaped by the counterfactual alternatives that are likely to come to mind more easily, as the antecedents of a specific event's outcome are more salient than the antecedents of a general event's outcome. Often, observers of general events are not even aware of such antecedents. Further, the other steps of the belief confirmation process (i.e., informal hypothesis testing of only the initial hypothesis, biased search for supportive evidence, and ignorance of alternative explanations) that contribute to thought confidence (Koriat et al., 1980) seem more likely to be "fed" by the richness of information provided by specific events as compared to that provided by general events.

Counterfactual thought confidence is relevant to other cognitive biases, such as the hindsight bias (Fischhoff, 1975; Fischhoff & Beyth, 1975). For instance, one may be given the answer to a question and subsequently overestimate the likelihood that they would have known the answer had it not been given to them. Tversky et al. (1992) characterized this overestimation as a kind of "counterfactual metacognitive confidence judgment" (p. 377). It is interesting to note that a reduction of this type of bias can be accomplished via an intentional form of counterfactual thinking, the consideration of why

and how an event's outcome may have turned out differently (Hirt & Markman, 1995; Slovic & Fischhoff, 1977).¹² It may be interesting to determine through future experimentation whether or not the richness of information provided by specific events, compared to that of general events, also aids in such de-biasing techniques.

The accessibility of counterfactual thoughts is a feasible explanation for why observers of specific events possess more counterfactual thought confidence than observers of general events in the first place. Because observers of specific events are afforded specific feature information, it may not only be easier for them to generate counterfactual simulations but they may also do so more quickly. It is well established that ease of thought generation (i.e., accessibility) is correlated with attitude strength and related variables that are conceptually similar to thought confidence (see Krosnick, Boninger, Chuang, Berent, & Carnot, 1993). Direct experience, as opposed to indirect experience, is also closely linked to attitude accessibility (Fazio, 1995). In the current experiments, specific event participants gained more direct experience than did general events participants. Furthermore, Petrocelli et al. (2007) demonstrated that a common accessibility manipulation can be used to influence a form of attitude certainty (i.e., attitude clarity). Thus, specific event participants may have been more confident in their mental simulations of alternative outcomes than general event participants due to their increased *counterfactual thought accessibility*, signaling greater certainty in their cognitive responses through metacognitive means (for more on this issue, see Petty et al., 2002).

Another possibility for the discrepancy in counterfactual thought confidence by event type appears to be that specific events provide an observer with information

relevant to the perceived demonstrability of a counterfactual thought. That is, specific event observers have information about the event that general event observers do not, and this may aid them in their attempts to support their likelihood estimates of an alternative outcome given a change in an antecedent. Take for instance a boxing match in which one unbiased observer watches the bout and another unbiased observer is presented with only some random highlight clips and general statistics about the bout (similar to the tennis match paradigm used in Experiment 3 and the horse racing paradigm used in Experiment 5). Observers who are cognizant of specific information (e.g., subjective estimates of the height, weight, and speed of each boxer) are likely to be more accurate in their estimates of just how likely something else could have, should have, or might have occurred differently than the observer who is aware only of the general statistics and outcome of the match. Even if both observers generate the counterfactual, “Ali should have won that bout,” the specific event observer is likely to have seemingly stronger evidence, from his or her event knowledge base, to support any such claim than would the general event observer. For instance, perhaps Ali appeared to be bloated and sluggish in the early rounds, or perhaps his opponent gave him a punch below the belt.

As in Experiment 5, some general event observers whose horse came in second place may have been just as likely as specific event observers (who bet on the same horse) to generate the close counterfactual: “My horse almost won the race.” Yet, the general event observer was not aware of how close the race actually was or the circumstances of the near win, whereas the specific event observer was aware of this feature. Thus, such a counterfactual may be perceived as more likely for the specific event observer. Furthermore, the specific event observer may possess readily available

and plausible information regarding other antecedents that may have changed the outcome had they been different (e.g., “Had my horse began his kick earlier, I might have won my bet”).¹³

Clearly, possession of sufficient information is a requirement for the demonstrability and plausibility of an argument (Laughlin & Ellis, 1986), and attitudinal confidence is believed to be associated with knowledge and an ability to demonstrate evidence for one’s arguments (Gross, Holtz, & Miller, 1995). With the knowledge provided by specific events, specific event observers would be expected to generate more convincing arguments for their claims than would general event observers. However, it seems that very little objective evidence may actually be needed to feel confident in one’s counterfactual argument. According to the “illusion of validity” (Einhorn & Hogarth; 1977), people often fail to recognize that some of their beliefs rest on inadequate evidence. Unjustifiably, people often appear to go a step further such that they regard their beliefs as a matter of objective evidence rather than as a matter of opinion or value.¹⁴

Alternative Considerations and Counterfactual Measurement

The paradigm employed in the current experiments varied the amount of information that general and specific event condition participants were given. Thus, it may be argued that specific event condition participants experienced a greater cognitive load; that is, they had more event information to think about than did general event participants. On the other hand, this difference in information reflects the essential difference in the current conceptualizations of general and specific events. Also, across experiments the two conditions did not differ in their overall number of thought

responses generated by participants. Still, the additional event information may have given specific event observers the sense that they were more fully informed about the antecedents of an event's outcome than were general event observers and in a better (more informed) position to make decisions about similar, future events. This notion was, in part, the thinking behind the hypothesis that counterfactual thought confidence would play an important role in reactions to events with varying degrees of specificity and in subsequent decisions regarding similar, future events.

However, all of the participants in the current experiments were cognizant of the outcomes of the events, and simply being more or less informed about how the events unfolded fails to explain the differences observed in subjective confidence or betting behavior regarding similar, future events. In other words, it seems likely that the difference in reactions to events and decisions regarding similar, future events depended more on how the event information was processed than on the amount of information given. The evidence for mediation of the event type-judgment relationship by counterfactual thought frequency supports this notion. Further, the amount of additional information given to specific condition participants was in some cases very minimal (e.g., the point value of hit cards taken by the dealer in Experiment 4). It is also worth noting that participants in each experiment were recruited on the basis of their knowledge and understanding of the type of event about which they would gain information (e.g., only those with knowledge about the rules and objective of blackjack were asked to participate in Experiment 4). Thus, participants were presumably familiar with the types of events they learned about.

Although the current set of experiments was more concerned with what people do with different levels of event information specificity than how well informed they felt about the event, the design of future experiments may rule out this potential confound by accounting for the potential influence of one's subjective sense of being informed about the event. Perhaps this variable can be controlled statistically by simply surveying event observers for how well informed they feel. Another possibility for future experiments is to increase the cognitive load of general event observers to match it against the cognitive load experienced by specific event observers. Adoption of the latter method may even increase the difference in counterfactual thought frequency between general and specific event observers by further reducing the chances that general event observers will engage in counterfactual thinking.

Another important consideration relevant to the current model is the affective involvement that general and specific event observers experience. Obviously, the valence of an event's outcome or the degree to which people have something "riding on" the outcome may lead to a wide range of potential affective reactions (e.g., happiness following a desirable outcome or disappointment following an undesirable outcome). When observing an event, people may also experience feelings of empathy or feelings of joy that are attached to the targets of an event, especially when their level of identification or affiliation with the target (e.g., the target is an in-group member) is particularly high (Smith, 1993, 1999) or the target is similar to oneself (Houston, 1990; Magee, & Tiedens, 2006; Stotland, 1969; Westmaas & Silver, 2006). Although affective reactions were not measured in the current experiments, it seems likely that both sources of affect (i.e., valence of the outcome and identification with the target) were present in

some of the experiments and that affective reactions were experienced. For instance, Experiment 1 involved targets with whom participants were likely to identify, Experiment 3 asked participants to take the perspective of one of the event targets, and the other experiments involved chances for participants to win money based on their performance on a task. Furthermore, watching an entire sporting event is likely to produce a greater level of excitement than simply reading about it or watching highlights.

Affective involvement in an event is relevant to the current model of reactions to general and specific events to the extent that it may be another consequence of counterfactual thought responses. The link between counterfactual thinking and its influence on affective reactions is well established (Markman et al., 1993; Roese, 1994) and is consistent with predictions based on cognitive appraisal theories of emotion (Schachter & Singer, 1962; Smith & Ellsworth, 1985; Weiner, 1986). However, affective involvement in an event may also serve as an antecedent to counterfactual thinking itself. As Roese and Olson (1995) have argued, the motivation (e.g., frequency and vigor) behind counterfactual thinking is in fact one's involvement in the event (i.e., an event's potential to affect an individual personally in some way) and general tendencies to avoid aversive stimuli and approach desirable stimuli. These notions are consistent with contemporary theories of affect that conceptualize affect as something that can influence and be influenced by cognitive and behavioral responses (see Russell, 2003). Thus, subsequent studies should account for affective reactions in addition to cognitive ones. It may also be fruitful to determine how cognitive and affective reactions to general and specific events interact to influence decisions regarding similar, future events.

These considerations, in addition to considerations of counterfactual thought confidence, suggest that an improved measure of counterfactual thought may be designed for future experiments that examine reactions to general and specific events, and how they affect decision making. Such a measure may also better address criticisms such as Anderson's (2003), who argued that particular characteristics of counterfactual thinking may be more potent predictors of reactions to events than the simple frequency of counterfactual thought generations.

An improved measure might include an assessment of the confidence that an observer holds in their counterfactual thoughts in at least two respects. In their discussion of the various factors that affect counterfactual thought generation, Roese and Olson (1995) made the distinction between antecedent-based and outcome-based determinants. That is, aspects of the event characteristics that led up to the outcome, as well as characteristics of the outcome itself, may influence the likelihood that counterfactual thoughts will be generated. Similarly, counterfactual thought confidence may have two distinct origins. When people generate a counterfactual statement, and they think about that statement, they may feel confident that the target of the event could have done something different. This type of counterfactual thought confidence may be termed *antecedent-mutability confidence*, as it represents the degree to which a person feels confident that a particular event antecedent could or should have been different. That is, the target (or targets) of the event had some ability to control the outcome and might have, could have, or should have, done something different. Antecedent-mutability confidence can be high (e.g., "He really could have selected the other door.") or it may be low (e.g., "He almost won, but he really didn't have much choice in the

matter.”). Another type of counterfactual thought confidence that is possible relates to the extent that one is confident that a change in an event’s antecedent would have actually led to a different outcome (e.g., a more desirable outcome). This type of counterfactual thought confidence may be termed *outcome-mutability confidence*, as it represents the degree to which a person feels confident that a particular outcome would have resulted had the event antecedent they mentally simulated actually taken place. In addition to antecedent and outcome mutability confidence, some attention should be placed on the measurement of the feasibility or the likelihood of a counterfactual alternative occurring. Finally, a measurement of affective dimensions could also prove to be useful as they may influence the tendency to engage in counterfactual thinking, or augment the influence that counterfactual thinking has on decisions regarding subsequent events.

Functional and Dysfunctional Reactions to General and Specific Events

In their attempt to reconcile predictions about general and specific cases inferred from Petty and Cacioppo’s (1981, 1986) ELM with Epstein’s (1983, 1985) CEST, Sherman et al. (1999) considered extensive processing to be more strongly associated with reactions to specific cases than with reactions to general cases. Sherman et al. went further to conclude that more extensive processing does not always lead to more accurate and rational decisions. Perhaps this tendency was observed in the current experiments. In any case, such considerations partially overlap the emerging debate of counterfactual thinking as functional or dysfunctional.

Many experimenters engaged in counterfactual thinking research agree that counterfactual thinking is most often quite functional. For instance, downward

counterfactual thinking may have a negative-affect regulatory effect by making people feel relatively better (relieved in most cases), whereas upward counterfactual thinking has been associated with preparations for the future and intentions to perform success-facilitating behaviors for future tasks (Markman et al., 1993; Roese, 1994). To the extent that it is related to attributions of causality (Wells & Gavanski, 1989), counterfactual thinking may lead to better understandings of the causal structure of a chain of events as well as feelings of controllability for future events (Markman et al., 1995). Upward counterfactual thinking may also enable people to mentally experience alternative, more desirable, worlds as in the case of what McMullen (1997) has referred to as the experiential mode of counterfactual thinking. Thus, counterfactual thinking appears to have several functional consequences.

However, not all theorists have agreed with such notions. Sherman and McConnell (1995) suggested that under some conditions counterfactual thinking can be dysfunctional. For instance, they argued that counterfactual thoughts can sometimes lead to illusions of control (Langer, 1975) to the extent that people expect the probability of success to be greater than that objectively possible. Furthermore, upward counterfactual thinking may lead to “emotional costs” such as self-blame, regret, resentment, guilt, and depression, whereas downward counterfactual thinking can lead to feelings of fear and vulnerability.

It seems feasible to conclude that counterfactual thoughts in response to an event may strengthen an illusion of control. Several studies, conducted by Langer (1975) and Langer and Roth (1975), demonstrated that, when people are engaged in a chance oriented task such as a lottery, and they are encouraged to engage in behaviors consistent

with skill events, they tend to exhibit the illusion of control. In fact, the more similar a chance event is to a situation involving skill, the greater is the likelihood that an illusion of control will emerge. If this illusion occurs for purely chance events, it seems almost certain to operate during skill-related situations or for situations that involve both chance and skill (e.g., playing gambling games that involve luck and skill, such as blackjack or betting on horse races). Thus, it is possible that the illusion of control was operating in some of the experiments within the current investigation, especially those in which participants were actively involved in the decisions (i.e., Experiments 2, 4, and 5). Indeed, participants did possess control over their decisions, and chance was only a partial determinant of the outcome. However, it seems likely that the more frequently an observer entertains what could have been, what would have been, or what should have been, the stronger the illusion may become. Thus, counterfactual thinking may lead to riskier decisions by contributing to a perceiver's subjective sense that they have more control over their outcomes than they actually do. With respect to this reasoning, it comes as no surprise that upward counterfactual frequency was more strongly related to betting behavior in experiments that placed participants in positions where they could partially control the outcomes of the events (e.g., Experiment 4 – playing blackjack and Experiment 5 – placing bets on horse races) than in experiments that did not (e.g., Experiment 1 – observing a miniature golf competition and Experiment 3 – observing a tennis match).

Sherman and McConnell (1995) argued further that counterfactual thinking can also lead to inaccurate causal inferences, calling into question its functionality as a method of understanding the causal structure of a chain of events. This possibility is

related to their doubt regarding the association between counterfactual thinking and preparation for the future as it relates to subsequent decision making. Sherman and McConnell argued that counterfactual thinking can lead to better preparation for similar, future events to the extent that the causal attribution embedded in the counterfactual thought is accurate (i.e., correct). It seems quite seductive to estimate the effectiveness of one's judgments and decisions simply on the basis of the outcome or consequences that follow (i.e., whether they are desirable or undesirable). However, good decision strategies can be followed by undesirable outcomes, and bad decision strategies can be followed by desirable outcomes. Thus, poor judgments and decisions do not always lead to bad outcomes, and good judgments and decisions do not always lead to good outcomes. If counterfactual thoughts lead people to make incorrect assumptions about the causal structure of an outcome, it could subsequently lead to changes in otherwise good decision strategies.

Although outcomes of previous events and pre-event expectations were sometimes correlated with dependent measures for specific event participants of the current experiments (see especially Experiments 4 and 5), they were not as strongly correlated with the dependent measures as was upward counterfactual thought frequency after controlling for the type of event. Expectations of fairness from flipping a coin should turn suspect if enough coin flips do not approximate the probabilities of an unbiased coin; that is, the coin does not meet pre-test expectations. Thus, it comes as no surprise that expectations for any particular outcome may change as more and more event-relevant information is gathered (Olson et al., 1996). Interestingly, this vital information may be thwarted by the mental simulation of alternatives following specific

events (subsequently increasing the chance of overconfidence for future, similar events). Clearly, not all of counterfactual thinking is dysfunctional. However, if counterfactual thinking prevents people from adjusting their expectations for the future or their confidence in their own or other's abilities by information gained from relevant events, it seems appropriate to categorize this type of counterfactual thinking as dysfunctional. Such cognitive responses may also be considered dysfunctional to the extent that decisions about similar, future events, as well as subjective confidence in those decisions, continue despite persistent expectancy disconfirmation. Such dysfunction is likely to be more pronounced following exposure to specific events than to general events. The strongest evidence for these notions comes from the significant interactions examined in Experiment 4 (see Figures 4.1-4.4).

Results of Experiments 4 and 5 suggest that people who gamble on and watch an event may bet more on the event, and on subsequent events, than people who gamble but do not watch the event. Perhaps a gambler who bets on horse races at the track and watches may bet more in the future than a gambler who bets with a bookie on the phone and watches no races (even if they experience exactly the same outcomes). Although persistence in gambling was not directly tested in the current investigation, it seems likely that such tendencies exist to the extent that the amount that one bets on an event is positively related to how long they may continue to gamble. Counterfactual thinking would seem to be dysfunctional to the extent that it causes people to continue gambling despite consistent failure. In any case, this possibility also warrants future investigation.

A final speculation regarding the issue of dysfunctional versus functional reactions to general and specific events relates to how people explain unexpected

outcomes. It is well established that people are more likely to seek explanations for unexpected outcomes relative to expected ones (Wong & Weiner, 1981). Sometimes people appear to ignore statistics or feel as though they live outside of the probability of undesirable outcomes, as if immune to factors that lead to such outcomes (but there are potential benefits to these beliefs, see Taylor & Brown, 1988). When such outcomes do occur, people's reactions may be characterized by counterfactual responses that explain them away (Gilovich, 1983). It appears that exposure to specific events makes it easier, in comparison to knowledge about the general outcome of the same events, to engage in such processing. This difference in ease may be due to the fact that mutable features of specific events are more salient, and thus, easier to counterfactualize. However, the follow-up to Experiment 5 suggests that an important difference may also lie in the degree of confidence that one has in their counterfactual thoughts generated in response to general and specific events. Perhaps people fail to consistently employ base rate information in personally relevant situations because their own unique experiences are weighted more heavily, and some of these unique experiences are counterfactualized to "fit" biased pre-existing expectations or desired outcomes. If this is the case, perhaps the bigger the discrepancy is between the expected outcome and the actual outcome (especially when unfavorable), the more motivated people are to counterfactualize the event (some evidence for this notion was observed in Experiment 4).

Speculations on Applied Implications

There are many areas in which the current conceptualization of reactions to general and specific events may be applied. In fact, the current framework may be applied to almost any area of life that involves some degree of risk, whether it be

gambling behaviors or important daily decisions. In these and other areas, many people may feel as though they “live outside of the statistics” associated with risk. For instance, many people feel that smoking is bad for their health, yet smoke; many feel that exercise is good, yet fail to exercise; many feel that pornography is bad, yet continue to purchase it; many feel that it is a good idea to practice safe-sex, yet apparently fail to do so; and many agree that visiting their physician or dentist for normal check-ups is good for their health, yet vigorously resist doing so. When people think of such things in the abstract, general sense, they may feel one way. Yet, when they think about actually engaging in these specific behaviors, they may feel another way. Are people simply hypocrites or do they process information about general and specific cases differently? Such forms of apparent cognitive-behavioral ambivalence (or weak links between attitudes and behavior) may be better understood as reactions to general and specific cases become better understood.

The current research is also relevant to how people use available information to make decisions, such as those made by managers and business leaders. Important decisions may be made on the basis of a single source or multiple sources of information. A policy decision, for example, may be made on the basis of an unfortunate event, whereas others may be made on the basis of a chronic problem, demand level, or continually sub-par revenues. An important question, as it relates to the current conceptualization of reactions to general and specific events, is whether managers make their decisions based on the “bottom-line” or on the basis of abundant specific information (possibly coming from multiple sources). For instance, a retail store manager may decide to discontinue the sale of sunglasses in his store on the basis of its

poor overall sales revenue record (i.e., a general event decision). On the other hand, another manager may decide to continue the sale of sunglasses in her store due to her awareness of specific information, such as the fact that the sunglasses should not have been displayed next to the hunting merchandise, and would have had a better sales revenue record had they been displayed next to the rest of the Summer seasonal merchandise (i.e., a specific event decision). A better understanding of whether or not people should make bottom-line decisions or invest time in making decisions based on a careful analysis of specific features of the relevant events may also be reached through continued study of reactions to general and specific cases in a wider arena. The current dual-process model of reactions to general and specific events may prove to be relevant to the practices of any profession whose professionals uses both statistical information as well as their own unique experiences to make decisions (e.g., diagnostic methods employed by medical doctors). With regard to making decisions when both sources of information are available (general/abstract/statistical vs. specific/individual), researchers (Dawes, 1993; Swets, Dawes, & Monahan, 2000) have argued on behalf of implementing more statistical models into the decision making process.

Finally, the current model may also be relevant to memory for general and specific event information. Although Gilovich (1983) has shown that participants remembered more information about their losses than they did their wins in a football betting task as a function of processing losses longer and in more detail, Garry and Polaschek (2000) have estimated that people can misremember a counterfactualized outcome as a truth, as a function of source confusion, familiarity, or source monitoring. If people counterfactualize specific events more so than general events, counterfactual

thinking could serve to reduce memory recall for specific events. However, because people may be less cognitively and emotionally engaged in general events, there may be several sources of recall reduction for general events as well. Apparently, there seems to be at least two different forces that could influence the degree to which people recall the past, and they appear to have different effects. One seems to be a focus on task failures due to counterfactuals, and thus, better memory for failures and a possible overestimation of failures; the other seems to be misremembering task successes that were nothing more than losses counterfactualized as a function of source confusion or familiarity and a possible overestimation of successes (i.e., recalling the counterfactual as what actually happened). Perhaps there are some conditions that lead to an overestimation via counterfactual thinking in one direction and other conditions that lead to an overestimation via counterfactual thinking in the opposite direction. In any case, these speculations warrant future experimentation to dissect such possibilities.

Conclusion

The results of five experiments supported the hypotheses drawn from Sherman et al.'s (1999) dual-process account of reactions to general and specific events, such that counterfactual thinking was associated more strongly with judgments and decisions following specific events than general events. Counterfactual thinking also tended to mediate the effects of event type on the dependent variables. Some evidence suggests that standards of comparison for general events appear to be influenced by some combination of pre-event expectations and possibly information gained from recent, relevant events. A follow-up to Experiment 5 provided evidence that counterfactual

thought confidence is also associated with subjective confidence in decisions regarding similar, future events.

The current investigation examined a cognitively-based model of reactions to general and specific events, while also examining how those reactions affect judgments and expectations for similar, future events. In addition to testing other relevant models by pitting them against the current model, it may be fruitful to examine affective reactions to general and specific events. Further, it is important to determine how cognitive and affective reactions to general and specific events combine to influence one's decision making processes and ultimately one's behavior.

Several other possibilities should be examined in this relatively new area of investigation. These include examination of how different aspects of counterfactual thought in response to events (i.e., level of counterfactual specificity, counterfactual thought confidence, and counterfactual thought accessibility) affect cognitive and affective reactions and decisions regarding similar, future events, as well as how memory for general and specific events is affected by these reactions. Because the current model relates directly to decision making behavior, it should also be examined in other situations and areas of judgment (not just sports and games), as it may have several applied implications.

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Footnotes

¹Admittedly, because the available literature relevant to this hypothesis is not entirely clear (see: Seelau, Seelau, Wells, & Windschitl, 1995), confidence in this hypothesis was somewhat limited. In one experiment conducted by Wells, Taylor, and Turtle (1987), the order of four events described in a scenario (any of which could be mutated to alter the outcome) was manipulated. These researchers demonstrated that people prefer to mutate earlier events and showed no preference for mutating the subsequent events. Importantly, the Wells et al. experiment described each event to participants as having caused the event that followed it. Another experiment that examined the effect of the order of two events in a causal chain on judgments of legal responsibility (Johnson, Ogawa, Delforge, & Early, 1989) revealed similar primacy effects. However, as Seelau et al. (1995) have suggested, it seems that an earlier event preference is significantly less likely when a causal chain is not strongly implied. In fact, in experiments involving independent event sequences, researchers (Byrne, Segura, Culhane, Tasso, & Berrocal, 2000; Miller & Gunasegaram, 1990; Walsh & Byrne, 2004) have found evidence for a preference to mentally undo those features that come last (or occur most recently) in the temporal sequence. Miller and Gunasegaram's (1990) arguments may apply for events with clear casual chains. However, Experiment 1 involved a non-causal chain of events. In any case, it is important to determine if counterfactual responses to general and specific events differ with respect to different trajectories leading to the same outcome, and whether or not such differences translate to different post-event judgments.

²Because participants were given false feedback regarding the correct answer to some of the trivia items, as well as their overall performance, two items (items 5 and 17) were specifically designed for the purpose of reducing any suspicions of false feedback. Thus, participants were never given false feedback regarding the correct answers to these items (because it would not be believable). The combined results of the two pilot tests ($N = 61$) showed that the correct response rate for these two items was 31.1% and 57.4% respectively.

³In the second pilot test, the correct responses rate for these particular items averaged 33.3%.

⁴To minimize suspicion of the validity of the feedback by providing participants with too much false feedback toward the end of the trivia test, the 20 items were divided into four sets of five items. Regardless of their responses to the first five items, they were informed that they had responded to two of them correctly. The second and fourth set of five items followed this same format. The third set of five items restricted the maximum correct to a single item. Again, false feedback was only provided when necessary (e.g., if a participant actually responded to the first two items of the first set, they were informed that they responded correctly to the first two items and responded incorrectly to the next three items, regardless of their responses).

⁵It is important to note that these analyses did not necessitate that participants complete a thought-listing task, as opposed to the analysis of upward counterfactual frequency as a

moderator. Thus, data from the entire sample was examined for these analyses. As expected, these results were consistent with the ANOVA results displayed in Table 2.1.

⁶With regard to the Sniezek and Buckley (1991) and Sniezek et al. (1990) experiments, it is important to note that overconfidence in one's abilities can develop through multiple routes, especially when people actively list their thoughts. Participants in the Sniezek and Buckley and Sniezek et al. experiments were not asked to list their thoughts. Therefore, these experiments are only conceptually related to Experiment 2. Participants were asked to list their thoughts (or not list their thoughts, depending on condition) after they received global or specific feedback about their performance. It is possible that simply asking people to list their thoughts about answering a specific trivia item encourages them to generate reasons why their answer is likely to be right, and subsequently become overconfident for that item. When asking people to list their thoughts about how they would perform overall (in general), they are likely to use their general knowledge of how they usually perform on trivia items -- and so they are not overconfident. Thus, thought-listing could potentially lead to overconfidence under some conditions without counterfactual generations.

⁷The reasoning behind the expectations that these scenarios would lead to upward and downward counterfactuals respectively is based on Markman et al.'s (1995) findings with regard to the perceived control of the outcomes. These researchers found that the direction of counterfactuals that people generate tend to correspond to the close outcomes associated with the aspects that they control. That is, following the experience of almost

unfavorable and almost favorable outcomes, it is easier for people to generate downward and upward counterfactuals, respectively, when they perceived themselves to be in control of the perceived antecedents of those outcomes.

⁸In cases whereby the number of general event + spoon-fed thoughts condition participants was greater than the number of specific events condition participants who picked the same horse for a race, the thought-listing response sets originating from each of the specific events condition participants were used with equal frequencies when possible. For example, in a case whereby seven general event + spoon-fed thoughts condition participants selected horse #3, but only two specific events condition participants selected horse #3, then four general event + spoon-fed thoughts condition participants were yoked to the thought-listing responses originating from one of the specific events condition participants and the other three general event + spoon-fed thoughts condition participants were yoked to the thought-listing responses originating from the other specific events condition participant. In cases whereby the number of specific events condition participants was greater than the number of general event + spoon-fed thoughts condition participants who picked the same horse for a race, the thought-listing response set was randomly selected (without replacement) from the pool of specific events condition participants.

⁹It is important to note that total cash winnings was not significantly correlated with either of the dependent variables.

¹⁰ A statistical explanation for these results (in both experiments) relates to the difference in sensitivity of the measures. The subjective confidence scales ranged from one to seven, whereas the tickets betting scales ranged from 10 to 100. In addition, although the two dependent measures were correlated significantly, there was still almost 50% of their variance that was not shared; suggesting at least some uniqueness as two different measures of confidence.

¹¹ In five of the six experiments, the overall degree to which participants counterfactualized the events was considered in light of the number of thoughts they listed. This proportion was further corrected by the number of counterfactuals that was expected given a particular total number of thoughts listed (i.e., Bayesian corrected proportion). Several of the analyses that involved counterfactuals were conducted with three slightly different measures of counterfactual frequency (i.e., the simple frequency, the proportion of counterfactuals, and a Bayesian corrected proportion), although only one is reported. In general, these measures “behaved” similarly. That is, regardless of the measure of counterfactual frequency, the conclusions were virtually the same. In any case, these measures of counterfactual frequency and others are worthy of examination in this new area of investigation.

¹² See exceptions in experiments conducted by Roese and Maniar (1997), Roese and Olson (1996), and Sanna, Schwarz, and Stocker (2002).

¹³In such examples, whereby general event observers also form counterfactual statements (e.g., “I shouldn’t have bet on that horse.”), counterfactuals generated by general and specific observers may differ in another very important way; that being the causal attribution embedded within the counterfactual. In the case of a close loss, it is possible that the specific event observer may judge their decision as a good one and blame the loss on the horse, whereas the general event observer may judge their decision as a bad one, blaming the loss on themselves and subsequently shifting otherwise good strategies in the future.

¹⁴Other arguments for counterfactual thought confidence are addressed in the Discussion sections of Experiments 2 and 5.

Table 1.1

Means and Standard Deviations of Pre-Event Expectations and Dependent Variables by Type of Event Condition, and Three-Way ANOVA Results for the Main Effects of Event Type (Experiment 1)

Variable	Event Type				<i>F</i> (1, 330)
	General ^a		Specific ^b		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Pre-event expectations					
Expected skill	4.66	1.12	4.76	1.10	.63
Expected win	4.76	1.05	4.93	1.16	2.11
Expected bet	4.15	1.31	4.36	1.44	1.76
Hypothetical bet	37.02	24.20	38.01	22.33	.21
Dependent variables					
Satisfaction	3.42	1.75	3.89	1.57	6.46*
Perceived skill	4.28	1.27	4.50	.99	3.59*
Likelihood IU-WR	4.34	1.13	4.63	1.15	5.21*
Likelihood betting IU-WR	3.78	1.49	4.22	1.40	7.88**
Expected bet on IU-WR	29.09	19.23	33.66	23.58	4.74*

Note. ^a*n* = 172, ^b*n* = 174, IU-WR = IU golfer to win in a rematch.

p* < .05. *p* < .01.

Table 1.2

Representative Selection of Counterfactual and Non-Counterfactual Responses to the Miniature Golf Competition from Participants in the Thought-Listing Conditions (Experiment 1)

Counterfactual responses:

“The IU player should have gotten a hole in one.”

“IU shouldn’t have hit so hard.”

“IU could have gotten a birdie if he didn’t mess up the first shot.”

“He would have done better but he wasn’t in control.”

“IU could have done a better job at aiming on that one.”

“I’m frustrated; he should have been more focused in the early holes.”

“Just a few less mistakes and we would have had him!”

“He should’ve picked up the pace for the red and white.”

Non-counterfactual responses:

“The IU golfer can read the layout of the ground well; he is the man.”

“I am not very happy; are you gonna just let Purdue hit his ball right past yours?”

“Those engineers are good at angles, but Purdue will never beat IU at mini golf.”

“People in West Lafayette are golf-obsessed; there are 12 golf courses there.”

“I think they need tail-gaiting for miniature golf; it’s intense.”

“It is tied again, how the tide can swing.”

“Indiana lost to Purdue – even in the virtual world this is not something to be taken lightly – there must be riots and bloodshed over this atrocity.”

“I’m gonna break his knee caps; Purdue stinks.”

Table 2.1

Means and Standard Deviations of Pre-Test Expectations and Dependent Variables by Type of Feedback Condition, and Two-Way ANOVA/ANCOVA Results for the Main Effects of Feedback (Experiment 2)

Variable	Feedback Type				<i>F</i> (1, 130)
	Global ^a		Specific ^b		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Pre-test expectations					
Expected number correct	12.61	2.60	13.39	2.51	3.13
Subjective confidence	4.58	.84	4.70	.96	.59
Actual performance	6.34	2.01	6.80	1.95	1.74
Suspicion of feedback	3.23	1.62	3.59	1.91	1.39
Dependent variables					
Expected number correct on NT	8.31	1.91	9.22	2.11	6.04*
Subjective confidence for NT	3.98	.94	4.52	1.23	7.52**
Hypothetical bet on new test	37.64	28.94	51.92	28.27	7.35**

Note. ^a*n* = 66, ^b*n* = 66. NT = new test. Actual performance was included as a covariate in the test of differences between the feedback conditions among the dependent variables.

p* < .05. *p* < .01.

Table 2.2

Representative Selection of Counterfactual and Non-Counterfactual Responses to Item Feedback from Participants in the Thought-Listing Conditions (Experiment 2)

Counterfactual responses:

- “I usually guess C when I don’t know - I should have guessed C.”
- “Damn it, I was going to pick that one; I should have known.”
- “Well if I knew the height of the Empire State Building I’d get it.”
- “I should have picked the largest number.”
- “Even though, I should’ve picked foot now that I think about it.”
- “I got mixed up; shouldn’t have been thinking of cheetah.”
- “I shouldn’t have picked greyhound because of their slow-ass bus service.”
- “I felt dumb; I am in anatomy now, so I feel like I should have known that.”
- “Duh...I should know this; I play cards all the time but usually it’s a drinking game...no wonder I don’t remember.”

Non-counterfactual responses:

- “Just go ahead and guess Germany.”
 - “The spine goes down your entire back and covers a lot of area.”
 - “Either way it’s a lot of miles.”
 - “Quarters are extremely heavy compared to dimes.”
 - “I did the math to determine the answer.”
 - “China is very good at many different sports and typically does well.”
 - “Most weather moves from west to east.”
 - “On ebay, anything is valuable.”
-

Table 3.1

Representative Selection of Counterfactual and Non-Counterfactual Responses to the Tennis Match from Participants in the Thought-Listing Conditions (Experiment 3)

Upward counterfactual responses:

- “I took an early lead but, I should have kept it.”
- “I wish I wouldn’t have made those little mistakes.”
- “I could have won if I had just been more consistent.”
- “If only I could have done a little better during the match.”
- “If I only I had won the tie-breakers.”

Downward counterfactual responses:

- “I’m relieved; I could have lost it all.”
- “It was a close match; it would have been closer had I not won the tie-breakers.”
- “It’s a good thing that I barely pulled through in the last 2 sets.”
- “Wow, that was close; I might have lost it had I not minimized my errors.”
- “I may have weakened and lost the match had there been a fifth set.”

Non-counterfactual responses:

- “That guy has nothing on me.”
 - “It sucks to lose.”
 - “I think I am going to get a drink.”
 - “I have an awesome drop shot.”
 - “I wonder if I made SportsCenter.”
 - “I’m the greatest, and I’m rich!”
-

Table 4.1

Means and Standard Deviations of Pre-Event Expectations and Dependent Variables by Type of Feedback Condition, and Two-Way ANOVA/ANCOVA Results for the Main Effects of Feedback Type (Experiment 4)

Variable	Feedback Type				<i>F</i> (1, 98)
	Global ^a		Specific ^b		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Pre-event expectations					
Expected number of wins	5.40	1.18	5.58	1.01	.67
Subjective confidence	4.88	.85	5.04	.78	.96
Number of wins	4.08	1.51	4.16	1.57	.07
Dependent variables					
Likelihood of winning BG	3.94	1.09	4.40	.99	4.98*
Subjective confidence BG	3.98	1.04	4.44	1.13	4.54*
Tickets bet on winning BG	53.38	33.84	68.20	31.04	5.10*

Note. ^a*n* = 50, ^b*n* = 50. BG = bonus game. Number of wins was included as a covariate in the tests of differences between the feedback conditions among the dependent variables; ANCOVA *df* = (1, 97). Adjusted means and standard errors are displayed for the dependent variables.

**p* < .05.

Table 4.2

*Representative Selection of Counterfactual and Non-Counterfactual Responses to
Blackjack Game Outcomes from Participants in the Thought-Listing Conditions
(Experiment 4)*

Counterfactual responses:

“I should have taken another card.”

“I should have stayed with the 19, but I lost to a 19 with a 15 before.”

“I would have won had I not taken so many risks and busted.”

“I should have won that one; I had a 20.”

“I should have stopped earlier and took the Ace as an 11.”

“I might win more games and it would be easier if there were more players with
more cards exposed.”

Non-counterfactual responses:

“I was a little nervous in this round, but still I ended up winning with a 20.”

“I had few thoughts, because right away I had blackjack.”

“A 16 is high, but it’s worth risking another hit.”

“I was not happy to get a 13 when the dealer had a Queen face up.”

“These are bad odds, but I’m feeling risky.”

“I’m reevaluating my idea of going to Vegas.”

Table 5.1

Means and Standard Deviations of Pre-Event Expectations and Dependent Variables by Type of Event, and One-Way ANOVA/ANCOVA Results for the Main Effects of Event Type (Experiment 5)

Variable	Event Type						<i>F</i> (2, 141)
	General ^a		Specific ^b		General+SF ^c		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Pre-event expectations							
Exp. winning bets	3.25	1.10	3.02	1.10	3.50	1.17	2.18
Subj. confidence	4.14	1.22	4.13	1.23	4.46	1.27	1.08
Success	4.35	1.10	4.06	1.11	4.46	1.05	1.70
Num. of winning bets	2.06	1.17	2.31	1.27	2.46	.85	1.55
Total cash winnings	15.94	13.38	16.48	9.54	12.65	9.14	1.75
Dependent variables							
Tickets bet on BR	27.18 _d	4.15	43.50 _e	4.16	49.30 _e	4.18	7.51**
Subj. confidence	2.53 _e	.21	3.06 _d	.21	2.31 _e	.22	3.68*

Note. ^a*n* = 48, ^b*n* = 48, ^c*n* = 48. SF = spoon-fed; BR = bonus race. Means in the same row with different subscripts differ significantly at the .05 level of significance (or less) according to a Tukey HSD post-hoc test. Number of winning bets and expected number of winning bets were included as covariates in the tests of differences between the event conditions among the dependent variables; ANCOVA *df* = (2, 139). Adjusted means and standard errors are displayed for the dependent variables.

p* < .05. *p* < .01.

Table 5.2

Representative Selection of Counterfactual and Non-Counterfactual Responses to Horse Race Outcomes (Experiment 5)

Counterfactual responses:

“I wish I would’ve bet my horse to win rather than to show.”

“Yes, yes, go! Damn, he almost got it.”

“He would have gained confidence and could have pulled it out had he gotten back into the pack.”

“My horse should have made a harder charge there at the end.”

“I should’ve gone with my gut and picked Baby Storm.”

“I wish I would’ve picked show; then I would’ve won money.”

“Why is he so slow? He should be better because he ran fast the race before.”

“Damn! I almost picked Gulch Jumper [the winner of the race] for that race.”

“I knew I should have researched the horses more carefully!”

Non-counterfactual responses:

“I felt proud when my chosen horse won the race.”

“Okay, I can do this.”

“I thought I’d do a little dance in my cubicle.”

“It was exciting because everyone was passing my horse.”

“I was already counting my winnings; it’s about damn time.”

“I feel kind of bad for the horses.”

“I don’t understand how you go from 2nd to 7th place in 2 seconds.”



“I’m tired of putting in thoughts, I want to see another race.”

Figure 1.1. Typical view of miniature golf course displayed to participants (Experiment 1).





Figure 1.2. Final scoreboard displayed to participants by the four trajectory sequences (Experiment 1).


Near comeback:

Hole	1	2	3	4	5	6	7	8	9	Total	
Par	2	2	3	2	3	3	3	3	3	24	
Indiana 	strokes	2	2	3	3	3	2	2	2	3	22
Purdue 	strokes	2	1	3	2	2	2	3	3	3	21

Blown lead:

Hole	1	2	3	4	5	6	7	8	9	Total	
Par	2	2	3	2	3	3	3	3	3	24	
Indiana 	strokes	2	1	3	2	2	3	3	3	22	
Purdue 	strokes	2	2	3	3	2	2	2	3	2	21

Last-hole defeat of even match:

Hole		1	2	3	4	5	6	7	8	9	Total	
Par		2	2	3	2	3	3	3	3	3	24	
Indiana		strokes	2	2	3	2	3	2	3	2	3	22
Purdue		strokes	2	2	3	2	3	2	3	2	2	21

Back-and-forth lead:



Hole	1	2	3	4	5	6	7	8	9	Total	
Par	2	2	3	2	3	3	3	3	3	24	
Indiana 	strokes	2	1	3	2	3	2	3	3	22	
Purdue 	strokes	2	2	2	1	4	3	2	2	3	21

Figure 1.3. Mean satisfaction with the IU golfer by event type and event trajectory conditions (Experiment 1). T-bars are displayed at $+1$ *SD*.

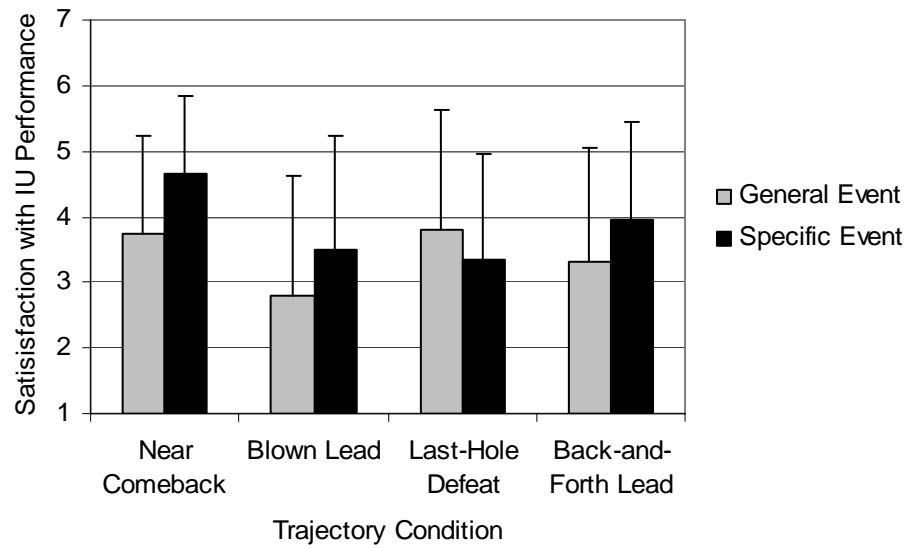


Figure 1.4. Predicted regression equation means of perceived likelihood of the IU golfer to win in a rematch (IU-WR) by pre-event expectancy level and event type (Experiment 1).

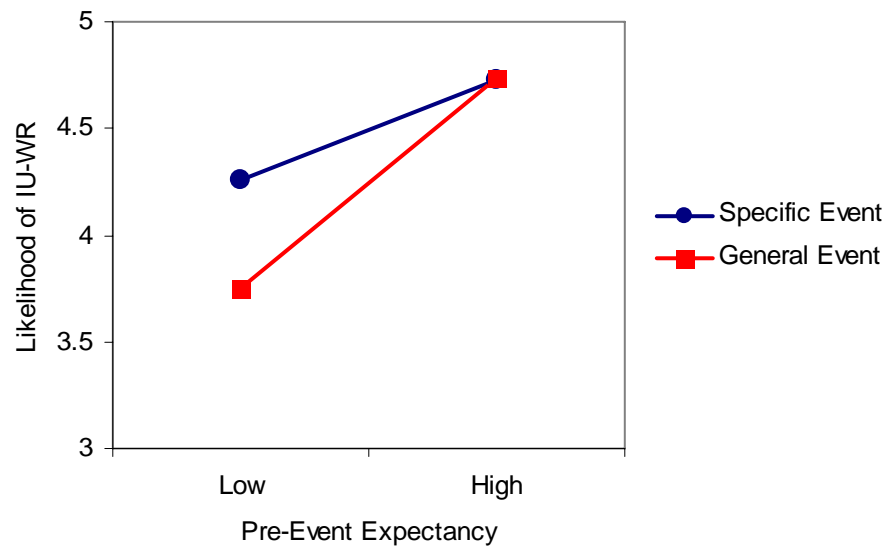
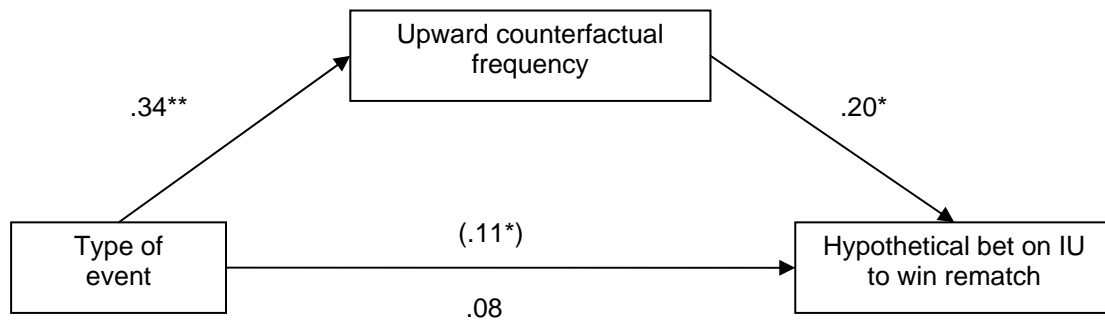
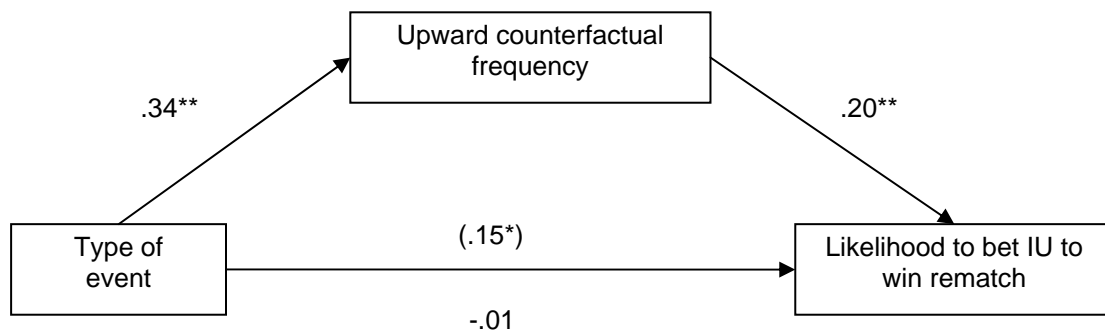
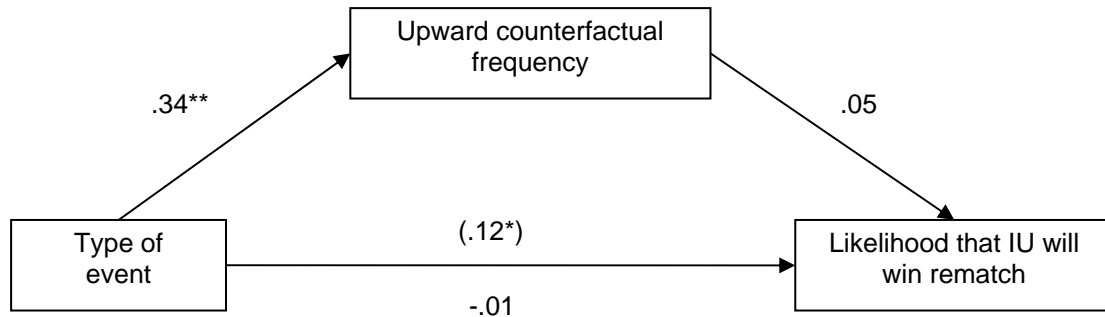


Figure 1.5. Results of tests of mediation of the relationships between event type and the dependent variables by upward counterfactual frequency (Experiment 1).



* $p < .05$. ** $p < .01$.

Figure 2.1. Predicted regression equation means of expected number correct on a new trivia test by upward counterfactual frequency and feedback type (Experiment 2).

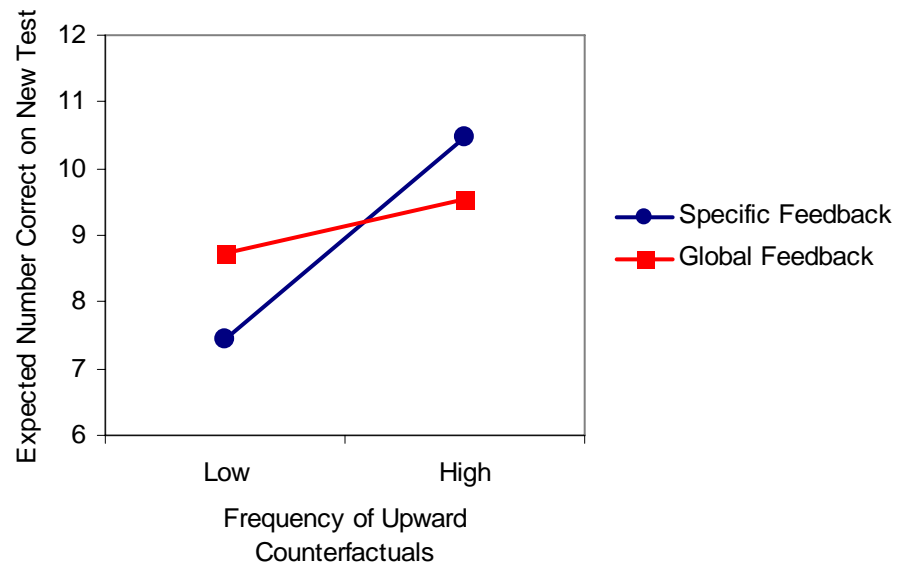


Figure 2.2. Predicted regression equation means of subjective confidence for a new trivia test by upward counterfactual frequency and feedback type (Experiment 2).

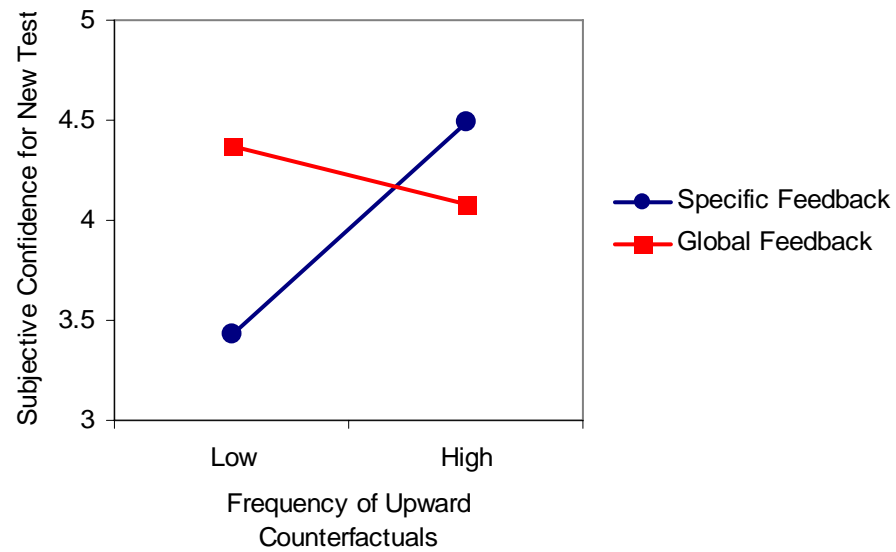


Figure 2.3. Predicted regression equation means of hypothetical bet on a new trivia test by upward counterfactual frequency and feedback type (Experiment 2).

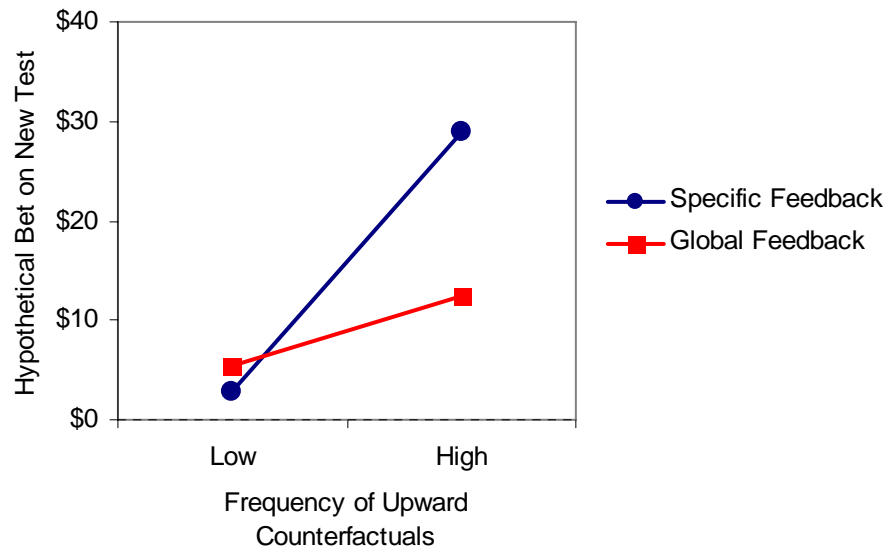
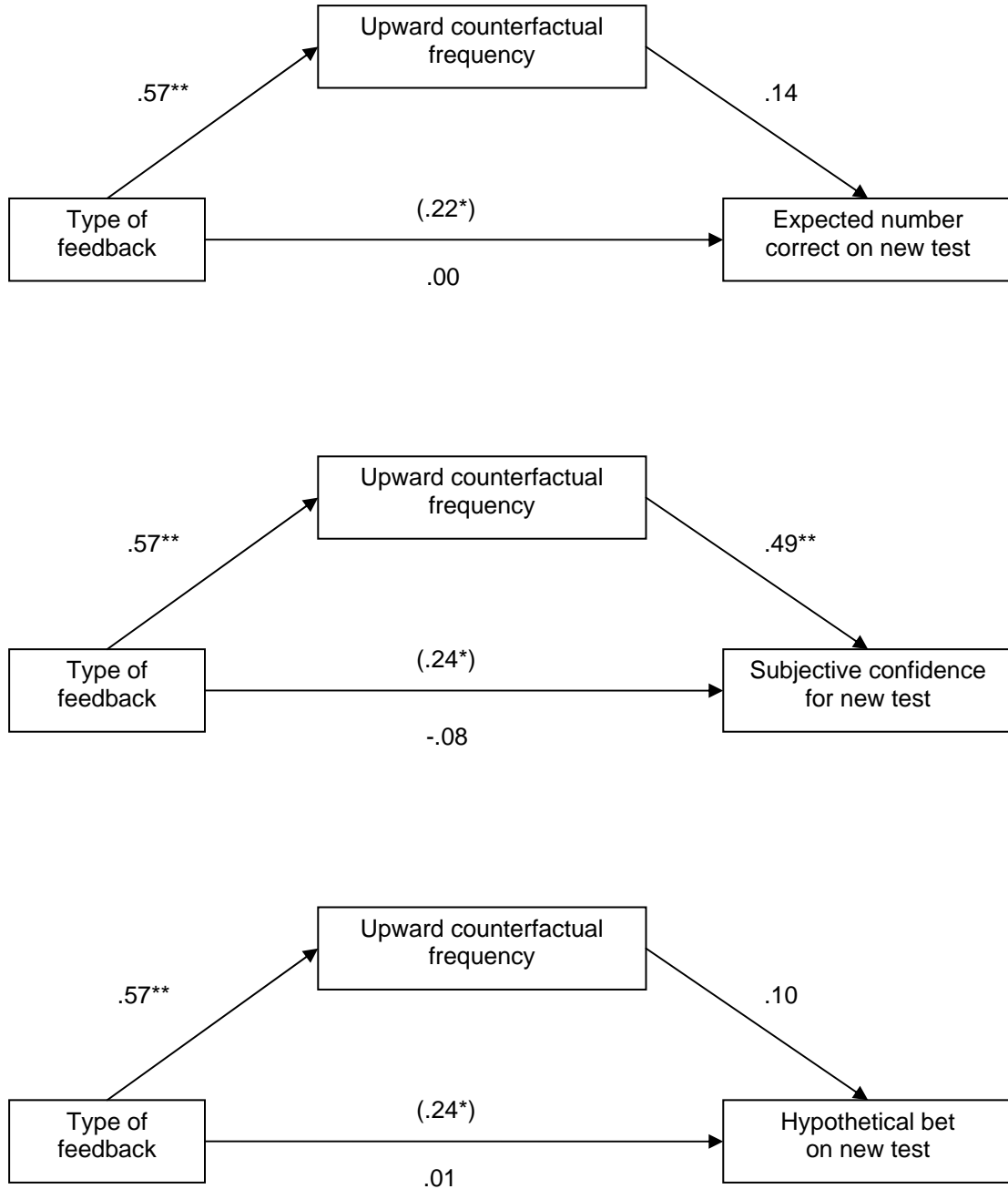


Figure 2.4. Results of tests of mediation of the relationships between type of feedback and the dependent variables by upward counterfactual frequency (Experiment 2).



* $p < .05$. ** $p < .01$.

Figure 3.1. Typical view of the tennis match displayed to participants (Experiment3).

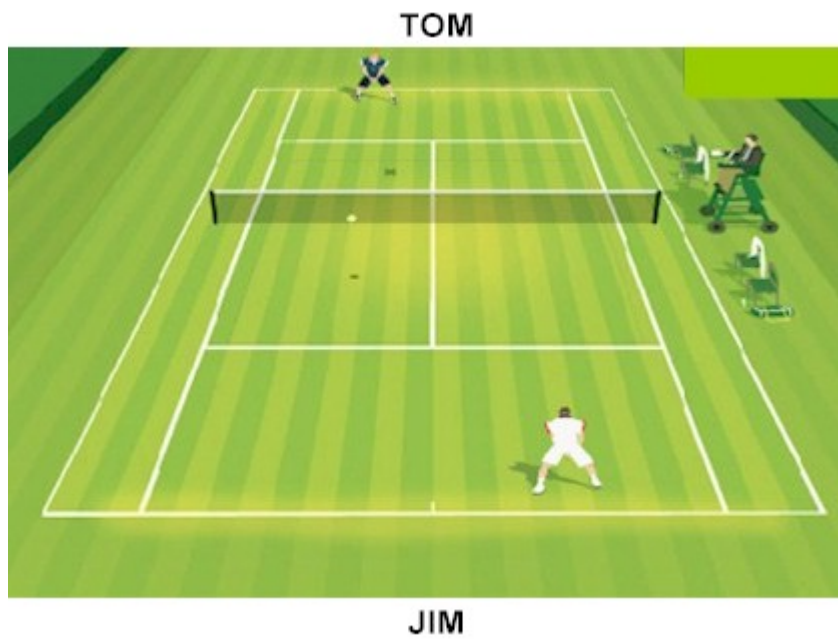


Figure 3.2. Adjusted Bayesian corrected proportion means of counterfactuals by event type, thought-listing instructions, and type of counterfactual (Experiment 3). T-bars are displayed at $+1 SE$.

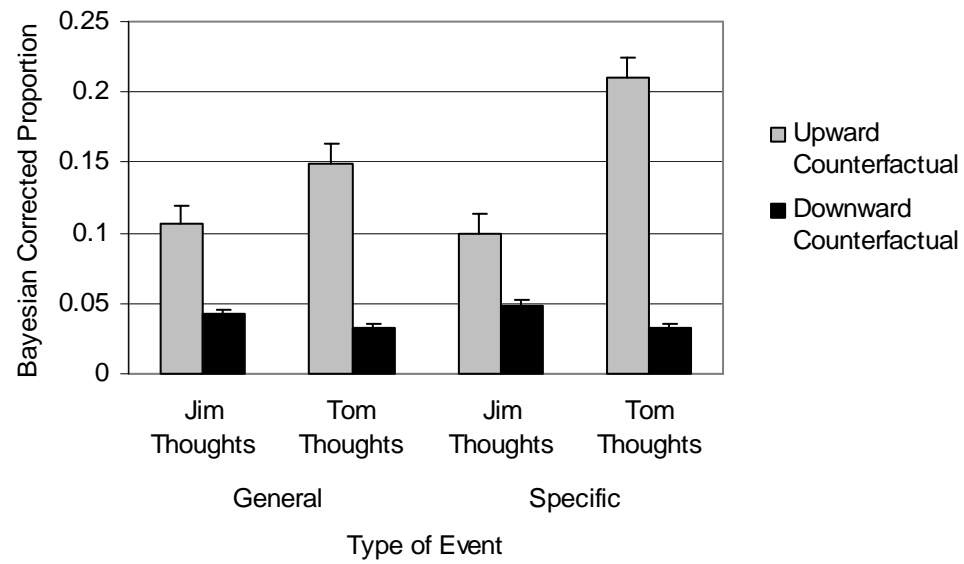


Figure 4.1. Predicted regression equation means of perceived likelihood of winning the bonus game (BG) by upward counterfactual frequency and feedback type (Experiment 4).

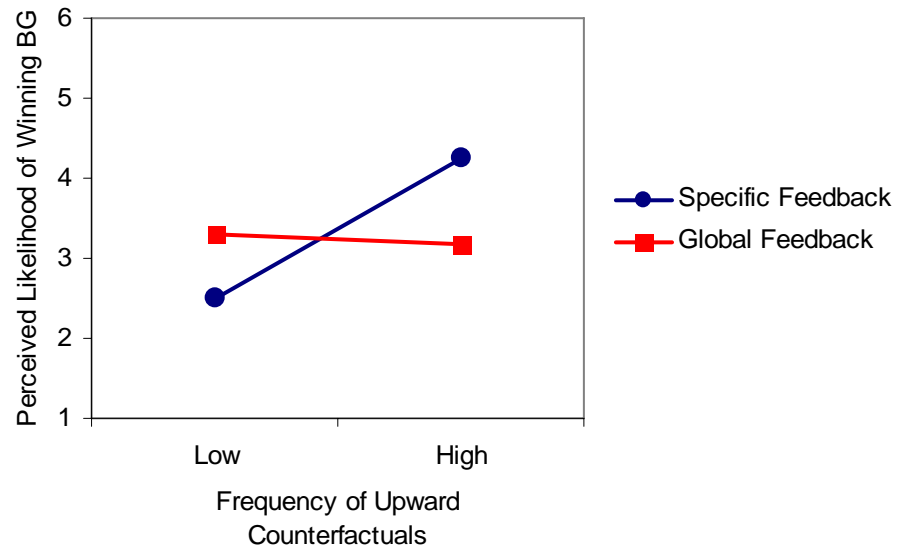


Figure 4.2. Predicted regression equation means of subjective confidence in winning the bonus game (BG) by upward counterfactual frequency and feedback type (Experiment 4).

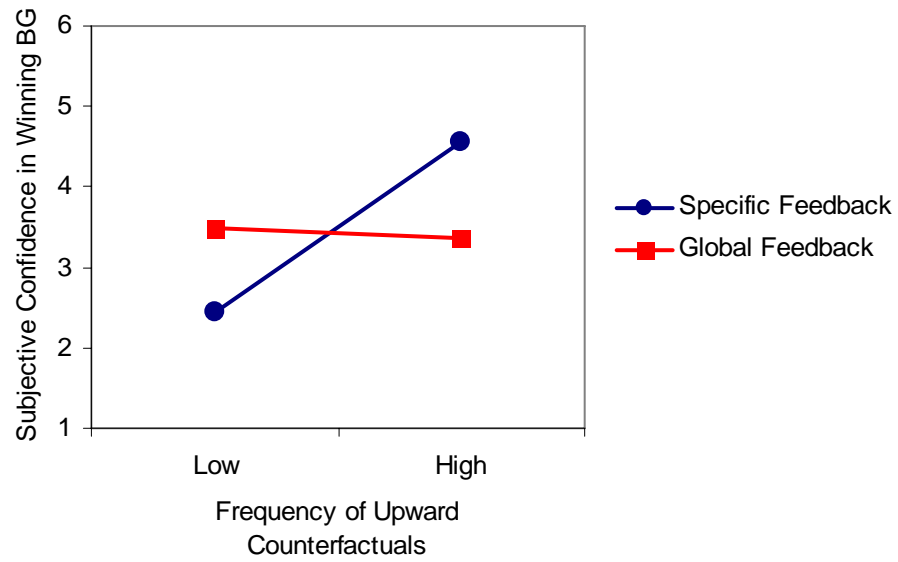


Figure 4.3. Predicted regression equation means of tickets bet on winning the bonus game (BG) by number of games of blackjack won and feedback type (Experiment 4).

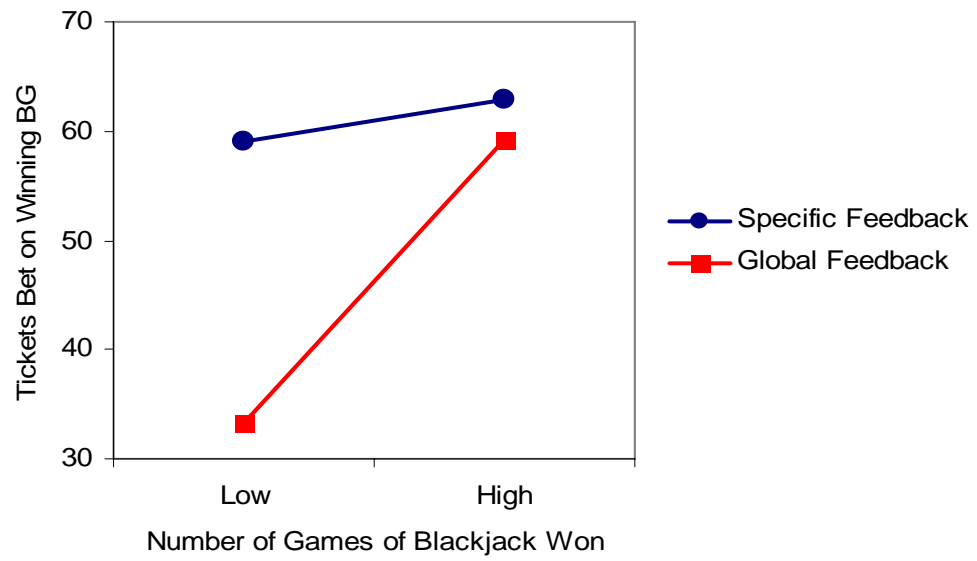


Figure 4.4. Predicted regression equation means of perceived likelihood of winning the bonus game (BG) by wins + upward counterfactual frequency and feedback type (Experiment 4).

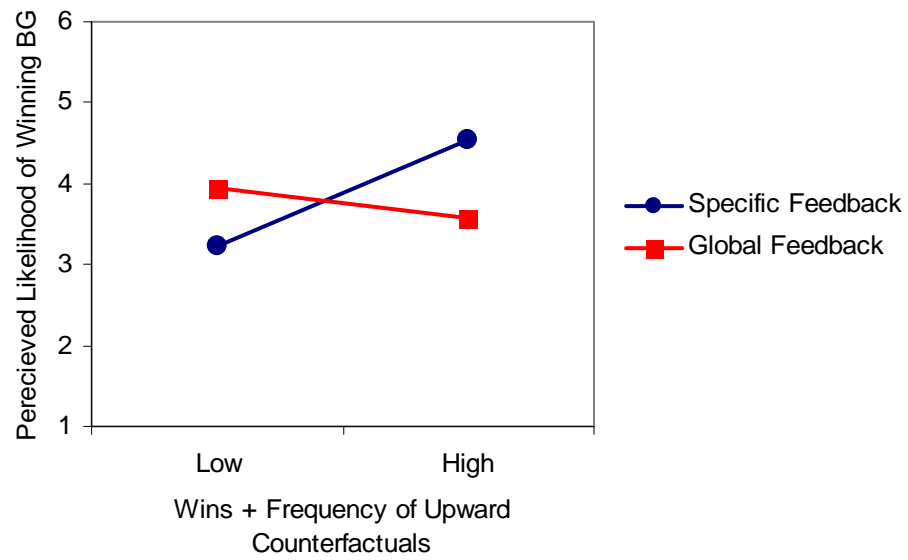
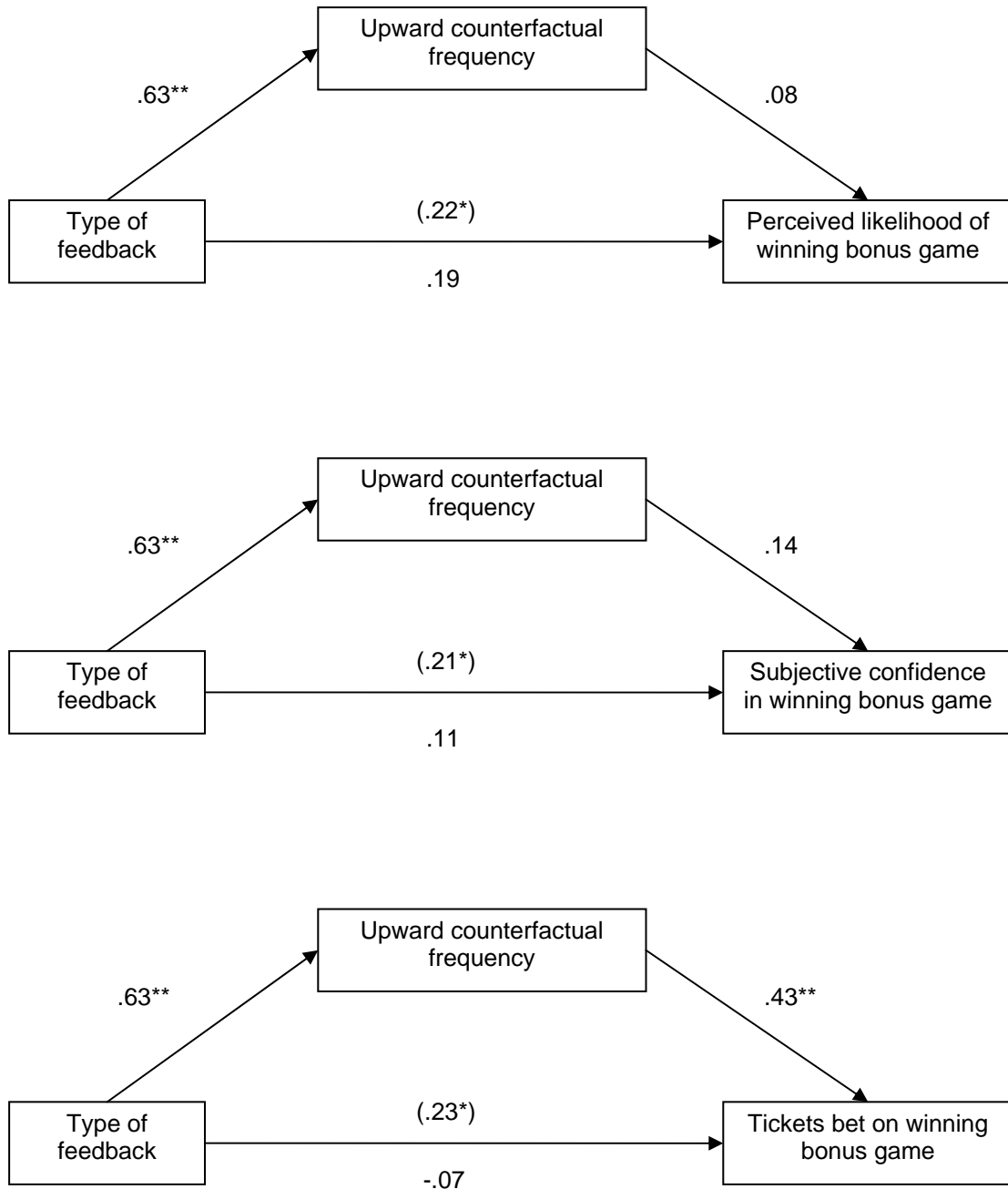


Figure 4.5. Results of tests of mediation of the relationships between type of feedback and the dependent variables by upward counterfactual frequency (Experiment 4).



* $p < .05$. ** $p < .01$.

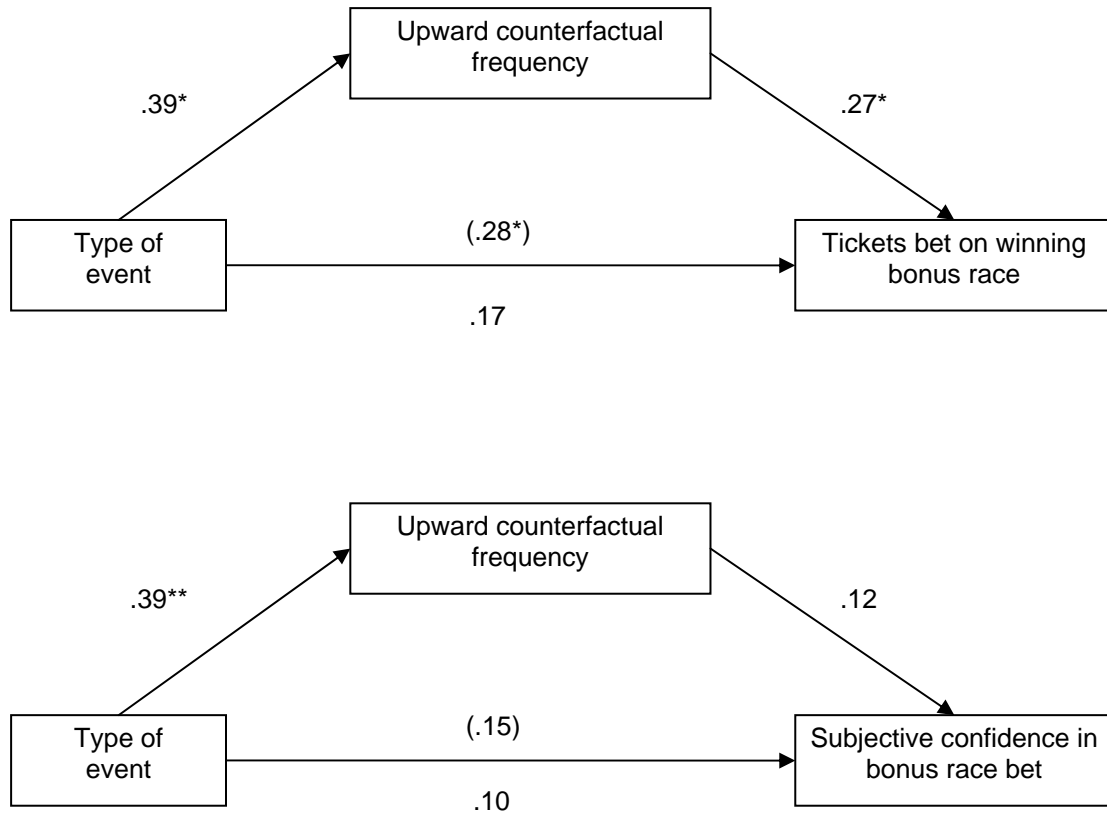
Figure 5.1. Finish position and payout schedule example (Experiment 5).

Finish Position	Horse	#	Win	Place	Show
Win	Betty Sue	6	\$20.00	\$8.80	\$4.80
Place	My Gal Sal	3		\$5.20	\$3.40
Show	Raid the Bank	2			\$2.80
4th	Prideful	8			
5th	Mangy Dog	4			
6th	Harry's Sally	1			
7th	J.R. Whitmore	5			
8th	Oklahoma Gunner	7			

Figure 5.2. Race program example (Experiment 5).

#	Horse	Win Odds	Lifetime Races	Win	Place	Show	Fastest Time (1 Mile)
1	Harry's Sally	7/1	10	2	1	0	1:40.25
2	Raid the Bank	3/2	13	4	1	1	1:41.33
3	My Gal Sal	7/2	18	3	1	4	1:39.20
4	Mangy Dog	5/1	10	1	1	1	1:38.67
5	J.R. Whitmore	33/1	11	0	1	1	1:41.45
6	Betty Sue	9/1	7	1	1	2	1:40.30
7	Oklahoma Gunner	10/1	19	2	2	5	1:43.89
8	Prideful	9/1	16	1	2	2	1:42.36

Figure 5.3. Results of tests of mediation of the relationships between type of event and the dependent variables by upward counterfactual frequency (Experiment 5).



* $p < .01$.

Appendix A

Trivia Items (Experiment 2)

1. Of the following fruits, which contains the most calories? (B)
 - A. Orange
 - B. Pear
 - C. Plum
2. Of the following states, which is the largest? (A)
 - A. Virginia
 - B. Kentucky
 - C. Tennessee
3. Which king in a standard deck of cards doesn't have a mustache? (C)
 - A. Diamonds
 - B. Clubs
 - C. Hearts
4. Which of the following universities has the greatest number of students enrolled? (B)
 - A. Princeton
 - B. Harvard
 - C. Yale
5. Which of the following soaps uses the "Clean as a whistle" slogan? (A)
 - A. Irish Spring
 - B. Coast
 - C. Zest
6. Which of the following U.S. cities receives the highest annual average of inches of rainfall? (B)
 - A. Honolulu, Hawaii
 - B. Boston, Massachusetts
 - C. Seattle, Washington
7. Of the following sandwiches, which contains the most calories? (A)
 - A. Burger King's Whopper
 - B. McDonald's Quarter Pounder with Cheese
 - C. Wendy's Big Bacon Classic
8. Which of the following animals can reach the fastest speed? (A)
 - A. lion
 - B. kangaroo
 - C. greyhound

9. Which of the following causes of death is most frequent in the United States among people of all ages? (C)
A. HIV/AIDS
B. Homicide
C. Influenza
10. Which of the following amounts of U.S. coins possesses the greatest total weight? (B)
A. 16 Quarters
B. 20 Nickels
C. 44 Dimes
11. Which of the following countries was second to the United States in the total number of medals won in the 2004 Summer Olympics? (B)
A. China
B. Russia
C. Germany
12. Of the following human body parts, which contains the greatest number of bones? (A)
A. a single hand
B. a single foot
C. the spine
13. Which of the following names is the most common among men in the United States? (A)
A. William
B. David
C. Richard
14. If one were to fly directly from Indianapolis to London, then fly directly from London to Miami, Florida, and then fly directly from Miami to Indianapolis, which of the following mile totals would he or she cover? (C)
A. 6007 miles
B. 8231 miles
C. 9437 miles
15. Which of the following states was not named after a Native American tribe? (A)
A. Oregon
B. Oklahoma
C. Ohio

16. If a penny were dropped from the top of the Empire State Building, how long would it take before it hit the ground? (C)

- A. 30 seconds
- B. 20 seconds
- C. 10 seconds

17. Which of the following wrist watch companies uses the slogan, "It takes a licking and keeps on ticking"? (C)

- A. Bulova
- B. Casio
- C. Timex

18. Which of the following letters is the most common first letter for the names of countries of the world? (B)

- A. A
- B. B
- C. C

19. According to the Antiques Roadshow, which of the following antiques is most highly valued in price? (A)

- A. a 1952 mint condition Mickey Mantle baseball card
- B. an authentic menu from the last luncheon served aboard the Titanic
- C. a mint condition Confederate Army officer Civil War era sword

20. Which of the following weights is the closest approximation for the weight of a gallon of milk? (C)

- A. 4 pounds
- B. 6.5 pounds
- C. 8 pounds

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Curriculum Vitae
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Counseling Psychology	University of Georgia	1999-2002
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B.A., Psychology	Westminster College, PA	1993-1997

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- Syllabus, lectures, assignments, examinations and grading
 - Statistical Techniques (K300): Summer 2006
 - Industrial/Organizational Psychology (P323): Spring 2006, Spring 2007
 - Introductory Psychology I (P101): Summer 2005
 - Advanced Statistics in Psychology Lab (P553): Fall 2006
 - Conducted a two-hour lab session weekly; demonstrated procedures for calculating various statistical tests
 - Introduction to Psychology Laboratory II (P154 Sections: 24559, 24562, & 24565): Spring 2005
 - Supervised Research I (P493), Supervised Research II (P494), & Readings and Research in Psychology (P495): Fall 2003 - present
 - Supervised and evaluated student lab assistants, conducted weekly lab reading/discussion meetings, supervised undergraduate theses projects
 - Social Psychology (P320): Spring 2004 - present
 - Independent study/distance learning course; evaluation via correspondence

Instructor, Ivy Tech Community College Bloomington:

- Syllabus, lectures, assignments, examinations and grading
 - Introduction to Psychology (P101-22 & P101-64): Spring 2007

Instructor Assistant, Indiana University Bloomington:

- Examinations, tutoring and grading
 - Advanced Statistics in Psychology (P553): Fall 2006, Professor: John K. Kruschke, Ph.D.
 - Social Psychology (P320): Spring 2006, Professor: Edward R. Hirt, Ph.D.
 - Social Influence Processes (P447): Fall 2005, Professor: Steven J. Sherman, Ph.D.
 - Intimate Relationships (P457): Fall 2005, Professor: Sharon S. Brehm, Ph.D.
 - Social Psychology (P320): Fall 2004, Professor: Scott Thompson, Ph.D.
 - Introduction to Psychology II (P102): Spring 2004, Professor: Alan Roberts, Ph.D.
 - Industrial/Organizational Psychology (P323): Spring 2004, Professor: Dominic Cooper, Ph.D.
 - Introduction to Psychology I (P101): Fall 2003, Professor: Gabriel P. Frommer, Ph.D.
 - Introduction to Psychology I (P101): Fall 2003, Professor: Joseph Farley, Ph.D.
 - Statistical Techniques (K300): Summer 2003, Professor: Cynthia Hoffman, Ph.D.
 - Introduction to Psychology II (P102): Fall 2002, Professor: Peter R. Finn, Ph.D.

Instructor Assistant, Slippery Rock University, PA:

- Examinations, tutoring and grading
 - Human Development and Educational Psychology: Fall 1997-Spring 1999, Professor: Ann H. Kemmerer, Ph.D.

RESEARCH INTERESTS

Social/cognitive processes that influence decision making, attitudes, resistance to persuasion, and inter-group perceptions and emotions; counterfactual thinking as it relates to reactions to general and specific events; the role of attitude certainty in resistance to persuasion and attitude change; formation of implicit and explicit group-based emotions and how they influence approach/avoidance action tendencies.

RESEARCH EXPERIENCE

Research Lab Coordinator, Indiana University Bloomington:

- Supervised undergraduate lab assistants and coordinated a research lab activities
 - Social Cognition Research Lab: Fall 2003 - present, Supervisor: Steven J. Sherman, Ph.D.

Statistical Analyst, Indiana University Bloomington:

- Conducted statistical analyses and reported results for publication
 - Kinsey Institute for Research in Sex, Gender, and Reproduction: Fall 2004 - Spring 2005, Supervisor: Erick Janssen, Ph.D.

Statistical Database Manager, University of Georgia:

- Assisted with the coordination of data collection and statistical analyses
 - Centers for Disease Control and Prevention, Multi-Site Violence Prevention Grant Project: Spring 2001 Supervisors: Carl J. Huberty, Ph.D. and Arthur M. Horne, Ph.D.

PUBLICATIONS

Social Psychology and Teaching of Psychology:

- Petrocelli, J. V. (in press). The utility of a computer-assisted power analysis lab instruction. *Teaching of Psychology*.
- Kay, A. C., Jost, J. T., Mandisodza, A., Sherman, S. J., Petrocelli, J. V., & Johnson, A. L. (in press). Panglossian ideology in the service of system justification: How complementary stereotypes help us to rationalize inequality. In M. Zanna (Ed.), *Advances in Experimental Social Psychology*. San Diego, CA: Academic Press.
- Petrocelli, J. V., Tormala, Z. L., & Rucker, D. D. (2007). Unpacking attitude certainty: Attitude clarity and attitude correctness. *Journal of Personality and Social Psychology*, 92, 30-41.
- Johnson, A. L., Crawford, M. T., Sherman, S. J., Rutchick, A. M., Hamilton, D. L., Ferreira, M., & Petrocelli, J. V. (2006). A functional perspective on group memberships: Differential need fulfillment in a group typology. *Journal of Experimental Social Psychology*, 42, 707-719.
- Petrocelli, J. V., & Smith, E. R. (2005). Who I am, who we are, and why: Links between emotions and causal attributions for self and group-discrepancies. *Personality and Social Psychology Bulletin*, 31, 1628-1642.
- Petrocelli, J. V. (2003). Factor validation of the Consideration of Future Consequences Scale: Evidence for a short version. *Journal of Social Psychology*, 143, 405-413.
- Petrocelli, J. V. (2002). Ambivalent Sexism Inventory: Where's the ambivalence? *American Psychologist*, 57, 443-444.

Counseling/Clinical Psychology:

- Glaser, B. A., Calhoun, G. B., Petrocelli, J. V., Bates, J. M., & Owens-Hennick, L. A. (2005). Depression and somatic complaints among male juvenile offenders: Differentiating somatizers from non-somatizers with the Millon Adolescent Clinical Inventory (MACI). *Journal of Forensic Psychiatry and Psychology*, 16, 566 – 576.
- Cohen, P. J., Glaser, B. A., Calhoun, G. B., Bradshaw, C. P., & Petrocelli, J. V. (2005). Examining readiness for change: A preliminary evaluation of the University of Rhode Island Change Assessment (URICA) with a male incarcerated adolescent sample. *Measurement and Evaluation in Counseling and Development*, 38, 45-62.
- Strano, D. A., & Petrocelli, J. V. (2005). A preliminary examination of the role of inferiority feelings in the academic achievement of college students. *Journal of Individual Psychology*, 61, 80-89.
- Trusty, J., Thompson, B., & Petrocelli, J. V. (2004). Practical guide for reporting effect size in the *Journal of Counseling & Development*. *Journal of Counseling and Development*, 82, 107-110.

- Scarborough, Z., Glaser, B. A., Calhoun, G. B., Stefurak, J., & Petrocelli, J. V. (2004). Cluster-derived groupings of the Behavior Assessment System for Children among male juvenile offenders. *Journal of Offender Rehabilitation*, 39, 1-17.
- Petrocelli, J. V. (2003). Hierarchical multiple regression in counseling research: Common problems and possible remedies. *Measurement and Evaluation in Counseling and Development*, 36, 9-22.
- Petrocelli, J. V., Calhoun, G. B., & Glaser, B. A. (2003). The role of general family functioning in the quality of the mother-daughter relationship of female African American juvenile offenders. *Journal of Black Psychology*, 29, 378-392.
- Petrocelli, J. V. (2002). Effectiveness of group cognitive-behavioral therapy for general symptomatology: A meta-analysis. *Journal for Specialists in Group Work*, 27, 92-115.
- Petrocelli, J. V. (2002). More on the consequences of savage reviews. *APS Observer*, 15(2), 7.
- Petrocelli, J. V. (2002). Processes and stages of change: Counseling with the transtheoretical model of change. *Journal of Counseling and Development*, 80, 22-30.
- Glaser, B. A., Calhoun, G. B., & Petrocelli, J. V. (2002). Personality characteristics of male juvenile offenders by adjudicated offenses as indicated by the MMPI-A. *Criminal Justice and Behavior*, 29, 83-201.
- Glaser, B. A., Campbell, L. F., Calhoun, G. B., Bates, J. M., & Petrocelli, J. V. (2002). The Early Maladaptive Schema Questionnaire–Short Form: A construct validity study. *Measurement and Evaluation in Counseling and Development*, 35, 2-13.
- Petrocelli, J. V., Glaser, B. A., Calhoun, G. B., & Campbell, L. F. (2001). Personality and affect characteristics of outpatients with depression. *Journal of Personality Assessment*, 77, 162-175.
- Petrocelli, J. V., Glaser, B. A., Calhoun, G. B., & Campbell, L. F. (2001). Cognitive schemas as mediating variables of the relationship between the self-defeating personality and depression. *Journal of Psychopathology and Behavioral Assessment*, 23, 183-191.
- Petrocelli, J. V., Glaser, B. A., Calhoun, G. B., & Campbell, L. F. (2001). Early maladaptive schemas of personality disorder subtypes. *Journal of Personality Disorders*, 15, 546-559.
- Petrocelli, J. V. (2000). [Review of the book Scientist-practitioner perspectives on test interpretation]. *Psychotherapy: Theory/Research/Practice/Training*, 37, 106.

PRESENTATIONS

Social Psychology:

Sherman, S. J., Petrocelli, J. V., Johnson, A. L., & Jost, J. T. (2005, October). *The poor are honest, but people who are poor are not: System justification and implicit associations of general and specific cases of rich and poor*. Paper presented at the annual Society of Experimental Social Psychology Conference: San Diego, CA.

Petrocelli, J. V., & Sherman, S. J. (2005, May). *Reactions to general and specific events and the role of counterfactual thinking*. Paper presented at the 77th annual meeting of the Midwestern Psychological Association: Chicago, IL.

Petrocelli, J. V. (2003, April). *Principles of impression formation in decision making*. Paper presented at the biennial meeting of the Social Psychologists of Indiana, Purdue, IN.

Petrocelli, J. V. (2003, February). *How happy were you last year? Beliefs about autobiographical memory and subjective well-being*. Poster session presented at the 4th annual conference of the Society for Personality and Social Psychology, Los Angeles, CA.

Counseling/Clinical Psychology:

Petrocelli, J. V., Calhoun, G. B., & Glaser, B. A. (2002, May). *Examination of family functioning variables in predicting African American female juvenile offenders' relationships with their mothers*. Poster session presented at the annual meeting of the Georgia Psychological Association, Savannah, GA.

Petrocelli, J. V., Glaser, B. A., & Calhoun, G. B. (2002, May). *The role of sensation seeking in the personality patterns, family discord, and delinquent predisposition of male juvenile offenders*. Poster session presented at the annual meeting of the Georgia Psychological Association, Savannah, GA.

Petrocelli, J. V., Glaser, B. A., Calhoun, G. B., & Campbell, L. F. (2002, May). *Preliminary evidence of four subtypes of affect and personality characteristics of adults with depression*. Poster session presented at the annual meeting of the Georgia Psychological Association, Savannah, GA.

Petrocelli, J. V. (2002, March). *Personality characteristics of depressed adults: Evidence of four distinct subtypes of affect*. Paper presented at the annual midwinter meeting of the Society for Personality Assessment, San Antonio, TX.

Petrocelli, J. V. (2001, August). *Meta-analysis of the effectiveness of group cognitive-behavioral therapy*. Poster session presented at the annual convention of the American Psychological Association, San Francisco, CA.

Petrocelli, J. V., Glaser, B. A., Calhoun, G. B., & Campbell, L. F. (2001, March). *Domains of psychopathology of empirically derived personality disorder subtypes*. Poster session presented at the 2001 conference of the American Psychological Association: Division 17 (Counseling Psychology), Houston, TX.

Petrocelli, J. V., Glaser, B. A., & Calhoun, G. B. (2001, March). *A discriminant analysis of adjudicated offenses of juvenile delinquent males with the MMPI-A*. Poster session presented at the 2001 conference of the American Psychological Association: Division 17 (Counseling Psychology), Houston, TX.

Petrocelli, J. V., Glaser, B. A., Calhoun, G. B., & Campbell, L. F. (2001, March). *Comorbidity of personality disorders and depression among outpatients*. Poster session presented at the annual convention of the Southeastern Psychological Association, Atlanta, GA.

Petrocelli, J. (1997, October). *Temporal focus and stereotypes*. Invited lecture presented at Westminster College, New Wilmington, PA.

Gray, D., Dymond, A., Towers, J., Petrocelli, J., & Rothenberger, S. (1997, June). *A first examination of the simultaneous construct validation of belief in equality and social dominance orientation*. Paper presented at the annual meeting of the International Society of Political Psychology, Krakow, Poland.

Petrocelli, J. V. (1997, May). *The role of temporal focus on risk behaviors in college students*. Unpublished bachelor's thesis, Westminster College, New Wilmington, PA. Paper presented at the annual meeting of the Western Pennsylvania Undergraduate Conference, Edinboro, PA.

REFEREING/EDITING EXPERIENCE

Ad Hoc Editor: *Social Behavior and Personality – An International Journal*: 2006
Journal of Cognitive Psychotherapy: 2006

Associate Editor: *Journal of Counseling and Development*: July 2002-June 2005

Editorial Review Board: *Journal of Counseling and Development*: July 2001-June 2002

Editorial Assistant: *Journal of Counseling and Development*: Aug. 1999-Dec. 2001
Supervisor: Earl J. Ginter, Ph.D., Editor

ACADEMIC HONORS, AWARDS AND FUNDING

APF/COGDOP Research Scholarship (2004):

American Psychological Foundation/Council of Graduate Departments of Psychology

College of Arts and Sciences Graduate Student Travel Grant (2003):

College of Arts and Sciences, Indiana University Bloomington

SPSP Student Travel Award (2003):

Society for Personality and Social Psychology

Diversity Fund Travel Award - Honorable Mention (2003):

Society for Personality and Social Psychology

Ruth G. and Joseph D. Matarazzo Graduate Research Scholarship (2002):

American Psychological Foundation/Council of Graduate Departments of Psychology

Graduate Teaching Assistantship (2002 – present):

Department of Psychology, Indiana University Bloomington

Mary S. Cerney Memorial Award (2002):

Society of Personality Assessment

College of Education Graduate Student Travel Grant (2002):

College of Education, University of Georgia

APA Science Directorate Student Travel Award (2001):

American Psychological Association Science Directorate

College of Education Graduate Student Travel Grant (2001):

College of Education, University of Georgia

Graduate Research Assistantship (1999 – 2002):

Department of Counseling and Human Services Development, University of Georgia

Academic Scholar Award (1999):

Department of Counseling and Educational Psychology, Slippery Rock University, PA

Charles M. Bennett Memorial Scholarship (1998):

College of Education, Slippery Rock University, PA

PROFESSIONAL AFFILIATIONS

Association for Psychological Science (APS) – *Member since 2000*

American Psychological Association (APA) – *Member since 1999*

Midwestern Psychological Association (MPA) – *Member since 2002*

Society for the Teaching of Psychology (STP), APA Division 2 – *Member since 2000*

Society for Personality and Social Psychology (SPSP), APA Division 8 – *Member since 1999*